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Precision SHOOTING

ALASKAN RIFLEMEN (Story on page 2)

a magazine for Shooters by Shooters

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THE COVER PHOTO

Shown are the members of the Ike Walton Free Rifle Team, Ancohrage, Alaska, winners of the Midnite Sun International Rifle League competition in 1960. Standing, left to right, are: Casey Holm, Arden Benthien and Dave Drew. Kneeling are Harold Curtis and J. Scott Donaldson.

This league is a postal competition over a three match schedule, each match consisting of 20 shots each in the prone, kneeling and standing positions at 200 yards on the reduced 300 meter International target. The positions are dictated by NRA rules, otherwise any rifle with any sights may be used. The competition is open to any who wish to enter. This is this league's fourth year of operation and it is expected that it will be continued in 1961. J. Scott Donaldson, Box 525, Anchorage, Alaska is the contact person for anyone who wishes more detailed information about this league.

LETTERS

My dear P. H.:

Just a short note to state my pleasure at having your most interesting book every month. Been a subscriber many years and see much improvement. In particular, this Nov. 1960 is good; good in subject matter, good in technical data, good in advertising, and good in **grammatical** form.

Incidentally, I have been interested in your .308 experiments. Also comments made by Harvey D. re the 7 m/m. I personally feel that the 7 m/m Mauser 154 gr. loading at 260 ft.-sec. is the best cartridge for eastern white tails here in Penna. My 7 lb. 1 oz. full-stocked sporter, 8.7 twist, will place all 10 Rem. factory loads in a 2-inch group any day. I tested factory loads first, then went to Hornady 154 gr. for hunting. Gives me more velocity with same good accuracy.

Also have tested extensively a model 70 Light-Weight cal. .243. Tried free floating and spot contact at fore end. No difference in accuracy, once stock had been relieved and action firmly re-bedded **tight.** Ended up with contact point. Accuracy, Three shots, ⅜", five shots, ¾". Loads: 43.5 grs. 4320 with 75 gr. Sierra and 44.5 grs. 4350 with 90 gr. Speer. My rifle has an excellent chamber. This is a "terrific" calibre, but all I do with it is run experiments. Too light for our deer, too powerful for our woodchucks.

If any of your subscribers request an accuracy load for the .25-'06 you might give them this: 52.5 grs. 4350 with 100 gr. Hornady bullet. Many shooters go "crazy" with these high intensity cartridges. Sensible loading to maximum **accuracy** should

(Continued on Page Four)

HOW TO RUN A PISTOL TOURNAMENT

By William E. Peterson

The average week-end registered tournament is scheduled on pretty well standardized lines. It is usually arranged so a contestant can fire four matches with the .22 pistol on Saturday, and four each with the .38 and .45, making eight more, on the following day. The .22 being most popular, may need three or four relays and the other two arms perhaps two relays each. In short, the usual registered tournament will run sixteen relays per day—a pretty long-winded business.

It is difficult to reconcile the above figures with the slick and expeditious handling of the yearly tournament run by the Westchester County (N. Y.) Police Revolver & Rifle League, Inc. In their recent mid-September tournament, instead of sixteen relays per day, they actually fired almost fifty—ninety-five relays over the two days. Moreover, each relay fired thirty shots, with three scoring periods, as compared with the twenty shots and two scoring periods in three out of four registered matches.

You might think this was achieved only by chasing the shooters through the matches with frantic haste. I can only state that this was definitely not the case. Shooters were not hustled, as I have been in a registered match upon one occasion, when the preparatory firing commands followed so closely after the command "LOAD" that one had no chance to spin the revolver cylinder to check for high primers.

What's the answer? Nothing more than the simple elimination of all unnecessary delays, of which most pistol meets have plenty. To quote the Westchester League program: "Contestant's name will be called twice . . . if he fails to respond and appear at the firing line immediately, entry shall be null and void.

"No alibis . . . No refires, except in case of a faulty target.

"After the command LOAD, all contestants must be ready within ONE MINUTE.

"All contestants must be prepared before entering on the firing line, and must have all necessary equipment before taking position.

"There shall be no delays or interruptions after the command READY ON THE RIGHT."

The quoted regulations are typical. They are pretty rigid, and they have to be, to put through almost three hundred shooters in two days, with only twenty-four firing points. They are also pretty sensible. Why, for instance, should a shooter need more than a full minute to shove five cartridges into a revolver, or a clip into an automatic? Or why should a careless contestant be allowed to hold up an entire firing line because he belatedly discovers that he has the wrong ammo, or perhaps searchers had to pry him away from the hamburger counter when he should have been on the firing line?

Scoring at the Westchester League tournaments is normally careful, but is also very fast, with one scorer for each six targets. There is no dallying over any one target—at any question, the doubtful target is instantly ripped off and taken back of the line for careful judging. Target boys follow right on the heels of each scorer, snapping on fresh targets. There is nothing leisurely about it—the whole business slides along slick as a whistle. I know this is supposed to be the case at most pistol shoots, but in my quite wide experience these Westchester folks are the only ones who actually follow it.

One other point which may have only a small bearing on delays, but is certainly important in the matter of justice to the individual shooter. Again, to quote the program:

"If there are more than the proper number of hits on a target, the contestant shall be given the value of the ten HIGHEST shots (provided that there shall be no evidence of fraud)." This is refreshingly opposed to the NRA regulations, where a wild shot from a neighboring shooter can spoil a fine score, giving the victimized shooter only the value of the ten **lowest** shots, or as an alternative the opportunity to shoot the score over, causing delay. A number of times at registered tournaments in these circumstances I have seen a shooter accept a reduced score, eliminating one of his highest shots, simply because he had no certainty of doing as well in refiring it. Apparently nobody has thought of giving the shooter the chance to take the highest of the two scores thus fired, rectifying at least some of the injustice. The Westchester League regulation gives the shooter the breaks, and avoids complaints, regrets, and ill-feeling.

A feature which is profoundly important in its effect on scores is the Westchester League regulation eliminating any stoppage or interruption in the sequence of firing commands after they are once started. Every experienced competition shooter is familiar with the frustrating and irritating effect of the "As you were" business when he is all keyed up to do his best, then is obliged to let off steam and relax, only to build up his determination all over again a few minutes later.

All in all, the regulations and procedure developed by the Westchester County Police Revolver & Rifle League, Inc., could well be carefully considered for adoption in whole or in part, at any tournament, as well as by the rules committee of the National Rifle Association. Speaking as a veteran of at least several hundred pistol tournaments registered and otherwise, I find the Westchester League tournaments by far the most enjoyable of the lot, in their freedom from boring delays and the fact that I can do all my shooting with three different caliber guns and still have half the week-end left for some other activity.

The September tournament brought out two hundred and ninety-one shooters, evenly divided between police and civilians. Don't ask me how they do it, but the total cost to each registrant, no matter how many of the matches he shot, was the modest sum of just two bucks. The awards were statuettes, and desk sets with clocks or calendars. The statuettes were police figures for police matches, and cadet figures for civilian matches, all with walnut bases. There were awards for first, second and third places in classes "A", "B", and "C", the classes being established in the usual way by dividing the list of scores into thirds. This, incidentally would seem a considerably more equable system than that used in registered matches, where I have seen one shooter of sharpshooter rating take every sharpshooter award, he being the only contestant in that class. He could not have enjoyed his winnings very greatly.

(Editor's comment: In the tournament described by Mr. Peterson, the firing was on Police targets of the Army L target type and dimensions. The matches were 30 shot events; 10 each slow, timed and rapid fire for a 300 possible score. Top ranking individual scores in the .38 cal. matches, in both team and indivdual events,

(Continued on Page Nineteen)

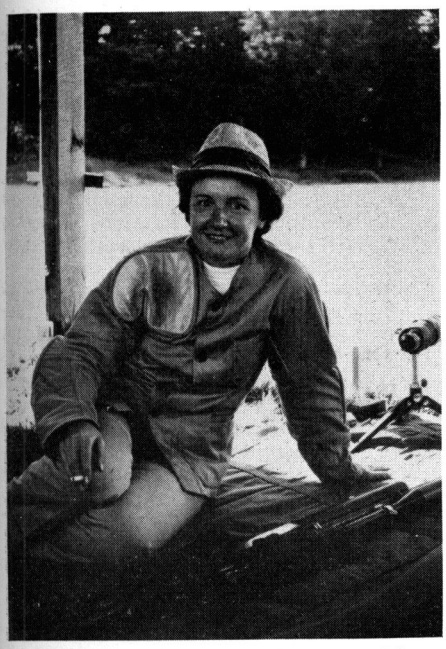
TOURNAMENT CIRCUIT

IN CALIFORNIA . . .

Tune up your deer rifle, your bench rest rifle, your target rifle and yourself at the

HUTTON RIFLE RANCH . . .

Official Range of GUNS and AMMO magazine
20 Covered Bench Rests with Spotting Scopes
Midway between Highway 101 and 101-A, in
Topanga Canyon, near Santa Monica, Calif.



Beatrice T. Kerns, Sudbury, Mass., who successfully defended her title as Massachusetts Women's Smallbore Rifle Champion in the October State Tournament.

MASSACHUSETTS

A total of 106 shooters, including 33 juniors of who more than half fired the complete senior program, participated in the Massachusetts Smallbore Rifle Championship matches in October on the Springfield Sportsman's Club range in South Monson. Shooting conditions must have been difficult because only one 400 possible score was fired during the day's four 40-shot match program, that in the first event of the day (any sight on the reduced metric target at 50 yds.) when Bill Kerns posted a 400-26x to win. In the following three matches, two with metallic sights, scores over 395 were outstanding.

Kermit J. Montross of Hartford, Conn. won the open championship with 1589-102x, a point and 21 X's ahead of John Crowley from New Haven, Conn. William L. Oliver, Jr., an expert class shooter from North Falmouth, Mass. was third high over-all and the Mass. resident champion with a score of 1581-86x. Beatrice T. Kerns, Sudbury, Mass., successfully defended her Woman's Championship title with her 1575-73 score to defeat Virginia Williams from Conn. by 3 points.

Miss Leigh Baxter, winner of the Florida open "Blackhawk Trophy," and her father, Eugene C. Baxter who was runner-up in this smallbore tournament aggregate.

FLORIDA

As has been the custom in the past several small bore rifle tournaments at Dr. Archer's private Pine Tree Rifle Range near Homestead, Florida, the 10th Annual Blackhawk Tournament was conducted on two successive Sundays; one Sunday for the junior competitors and lower class seniors, the following Sunday for the master and expert classes.

On the date reserved for the so-called "hot-shots," however, it was a pretty junior, Miss Leigh Baxter, who confounded all the veterans by steadily plugging away through a gusty 30 to 35 m.p.h. fishtail wind to be proclaimed the winner of the grand aggregate trophy with her 1583-85x score plus an individual win of the 100 yard metallic sight event with 391-14x.

For one half of the day's program it appeared that the battle might resolve between the current Florida state champion, Wilson White of Lake Worth, and Eugene Baxter of Miami Springs, with Baxter winning the first two matches and White a close second in each. Leigh Baxter at this point was 4 points behind her father who had dropped but one point in the two events.

However, as the field shifted from 'scope sights to metallic, and as the wind began to really howl, so did the veterans as they saw more than a few 9's and 8's crop up in the devastating shifts.

In the Junior division it was DeBrue Davis of Ft. Lauderdale and Miss Linda Pool of South Miami all the way and they ended up only 1 point and 2 X's margin in the grand aggregate with Davis' 1581-83x winning the Junior Blackhawk Trophy.

Dr. F. P. Archer, Jr.

CONNECTICUT

The Rippowam Rifle Club clinched the Connecticut Big Bore Rifle League championship with a decisive 617-54V to 611-28V win over the Springfield Sportsmen's Club (Mass.) in the final of the five match league schedule. The Roslyn Club from Long Island was third with 610-29V. Don Bush of Torrington and R. Dornau of Roslyn fired individual 125 possible scores, Bush with 10 V's and Dornau with 7.

The Rippowam team was beaten by only one team during the 1960 season. In the final match, the score of the sixth through tenth place shooters on the Rippowam team would have tied the point score (604) of the fifth place Bell City team and outranked Bell City by 3 V's; that is fine team "depth."

Having high individual averages for

(Continued on Page Four)

Tournament Circuit

(Continued from Page Three)

the season were R. M. Scheller, Capitol City, 123.2 for 5 matches; Sam Burkhalter, Cos Cob, 123.0 for 4 matches; and Otto J. Kolb, Rippowam, 122.7 for 4 matches. The course of fire is 5 shots in each the prone, sitting and kneeling positions and 10 shots standing, all slow fire at 200 yards on the Army "A" target.

NEW JERSEY

The Roseland Rifle Club team made a clean sweep win of the 16 matches of the 1960 Roseland Smallbore Rifle League. The first eight matches of the sixteen match schedule were at 50 meters and the final eight matches were at 100 yards on the International target, all with any sights. The Madison Rifle Club team were runners-up with 14 won and 2 lost.

High individual averages were: J. E. Sundstrom, Roseland, 199.688; Fred Triggs, Madison, 199.688; J. F. O'Hare, Roseland, 199.385. Ruth Fox, Ciba, had high iron sight average of 197.462.

A total of 137 shooters participated in one or more of the league matches, with 67 competing in two-thirds or more of the matches.

Letters

(Continued from Page Two)

be the objective. And 3250 ft.-secs. with a 100 grain .25 cal. bullet is really an effective load.

This "short note" is running away with me. But I must mention the Schuetzen article by Westergaard. Another fine and interesting article. We do much off-hand shooting around here at our Penna. turkey matches. It's most interesting.

Would it be a good idea to have bench rest championships by calibre? Why not a 6 m/m champion, a .25 cal. champion, etc? "Ernest Stuhlschuter" wants ideas, he says. Also, you might work up a 7 lb. center fire champion, or an 8-lb., etc., etc.

Sincerely,
R. W. Hildebrand
Wilkes-Barre, Pa.

OBSOLETE MILITARY RIFLES

Dear Mr. Teachout:

I should like to call your attention to a possible error in the answer which the rifleman, R. W. Lathrop, gave to one of his questioners, James F. Rudolph of Springfield, Virginia, on page 9 of the October issue.

Reader Rudolph had written to Lathrop concerning the use of one of the Argentine Mauser rifles of the Model **1909** (note that) designation. I am afraid that Mr. Lathrop has lumped all the Argentine Mausers into the much older and inferior Model 1891 classification, for in his reply to reader Rudolph he states, and I quote; "I do not believe I would use the Argentine action—but, I would surely rate it below a good Springfield or Mauser 98. It does not have as good metal as the Springfield, the magazine is not conducive to good stock lines and the trigger and bolt stop are no better, if as good."

Now, all the model 1909 Argentine Mausers I have encountered are more or less identical with the Mauser 98s. As a matter of fact they are somewhat better, even than the 98, for they have a hinged floorplate. Metal is good in them. They are mostly all made by DWM, with some of them made into the 1920's, even. They cock on the opening motion of the bolt, have the same bolt release as the 98 and with the exception of the trigger-guard-magazine floor plate assembly are identical to the Mauser 98. You might better check into this.

(Continued on Page Fourteen)

BARREL VIBRATION

By Creighton Audette

Mr. Grigg's article, "This Vibration Business," and Mr. Friesecke's letter, "A Barrel Vibration Experiment," both published in the October issue of Precision Shooting were of great interest to me. Some time ago, in one of my short articles in Precision Shooting on this subject, I wrote that, in my opinion, the first thing to do was to research the books and writings of those phople who had experimented with gun barrel vibration in the past. From their tests and results, it should be possible to better direct future research.

One of the readers of Precision Shooting, Mr. Homer Powley, through our good editor, suggested that I obtain a copy of "The British Textbook of Small Arms," edition of 1909. After some search, a copy was obtained and the following is quoted from it. Figure 6 is not reproduced from the text as it is merely a line drawing of the Lee-Enfield rifle showing that line of force A-B coincident with the barrel axis with the center of gravity about one third of the way up from the bottom line of the stock and under the chamber.

When a rifle is fired, the explosion of the charge causes a pressure often amounting to 16 tons or more per square inch acting along the line A B, Fig. 6 above the centre of gravity of the rifle; this tends to suddenly force the body and barrel to the rear. These components form an unsymmetrical mass attached to the stock, and are caused to vibrate by the shock to which they are subjected. These vibrations are both in the vertical and horizontal plane, so that the resulting motion of the muzzle is in the form of an ellipse, of which generally speaking the longer axis is approximately vertical.

The vibrations of the barrel are also partly due to the friction between the bullet and the barrel. This is known from the fact that, although the velocity of the bullet does not differ when fired from a dry barrel, and when fired from one which is slightly oily, yet with the Lee-Enfield rifle the mean point of impact is decidedly higher with the oily barrel.

The vibrations of rifle barrels have been studied by means of instantaneous photography, by Professors C. Cranz and K. R. Koch, and the Figures in Plate IV, and information concerning them, have been taken from their work entitled "Untersuchungen uber die Vibration des Gewehrlaufs," which work was published by the Krieg Bayerischen Akademie der Wissenschaften, who have courteously granted permission to reproduce them.

The vibrations were measured as follows:—

A piece of wire, W, Fig. 7, is attached to the barrel of the rifle at the point at which the vibration is to be measured, so that the horizontal portion of the wire crossed a brightly lighted slit, S. The magniifed image of this slit is thrown on a photographic plate which is in rapid motion from side to side at the instant of firing. Now, if the barrel and wire remain steady, the latter will be represented on the photographic plate by a horizontal black line, but if the vibration of the barrel causes the wire to move up and down, then instead of a straight black line we shall get an undulating black line, as shown in the lower half of the figures in Plate IV.

To measure the time occupied by these vibrations of the barrel a second wire, attached to a tuning fork, T, which makes a complete vibration every .0023 second, is placed in front of the illuminated slit. The regular up-and-down motion of this wire produced the black zigzag line shown in the upper half of the figures.

To mark the exact point at which the bullet leaves the muzzle, it is made to cut an electric wire as soon as its base is clear of the muzzle, thus causing an electric spark, which appears as a bright dot marked (r) in the figures. The vertical line (a) in some of the figures marks the beginning of the impact of the striker, and (B) the instant of the explosion of the charge, the small vibrations between (a) and (B) are therefore caused by the impact of the striker.

The general results established are as follows:—

1. The rifle barrel is subject to two sets of vibrations in the vertical and horizontal plane, viz., a fundamental note caused by the vibration of the whole length of the barrel, and an overtone, or octave note, caused by the division of the barrel into vibrating sections, with nodes between them, where the barrel is still. In Fig. 4 the line (r) cuts the top of the first fundamental vibration, while the bottom of it is just out of the plate. The smaller vibrations in the curve are the overtone vibrations.

2. As affecting the shooting, the overtone vibrations are the more important, because the fundamental vibration has hardly begun before the bullet has left the muzzle.

3. In the German 1871 Mauser rifle, .433 bore, the bullet leaves the barrel during the first upward overtone vibration when the muzzle is bent upwards, the effect being to make the rifle shoot high (see Fig. 1). With a half charge the bullet does not leave the barrel till three-quarters of the first overtone vibration is accomplished, when the muzzle is bent downwards, the effect being to make the rifle shoot low (see Fig. 2). With a quarter charge the bullet does not leave the muzzle till after one and a quarter overtone vibrations, when the muzzle is again bent upwards, the effect being to make the rifle shoot high (see Fig. 3).

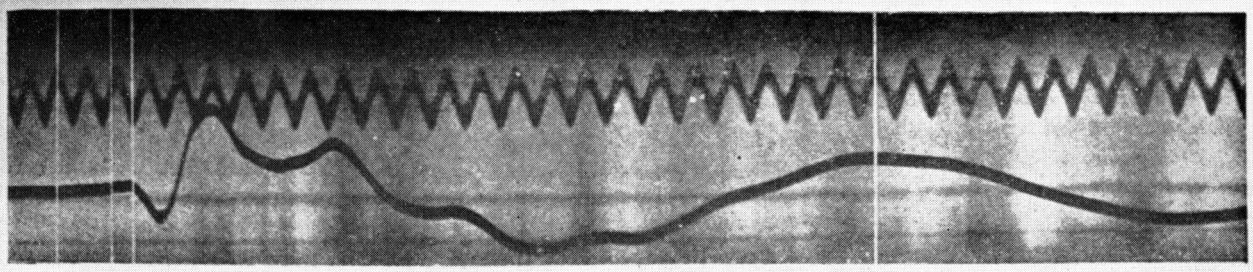
These three experimental results are completely in accordance with the actual shooting of the rifle.

4. It has been found by experiment that whether the rifle be held firmly in a fixed rest, or laid on supports so as to imitate as far as possible the manner in which it is held by a skilled rifleman, the vibrations of the barrel on firing do not differ in nature or direction, though they may differ in extent.

5. It will be noticed in Figs. 1, 2, 3, representing the vibrations due to firing full, half, and quarter charges from the 1871 pattern Mauser, that the smaller the charge, and consequently the less the velocity of the bullet, the greater is the number of vibrations the barrel has made before the bullet issues from the muzzle. Also in Figs. 4 and 5 of the German Mauser, pattern 1898, and the Spanish Mauser, with muzzle velocities of 2,034 f. s. and 2,288 f. s. respectively, the bullets leave the muzzle while the vibrations are still very small. It may be assumed, therefore, that the improved accuracy of modern small bore rifles is partly due to their high initial velocity, which enables the bullet to leave the barrel before the vibrations have caused much disturbance of the muzzle.

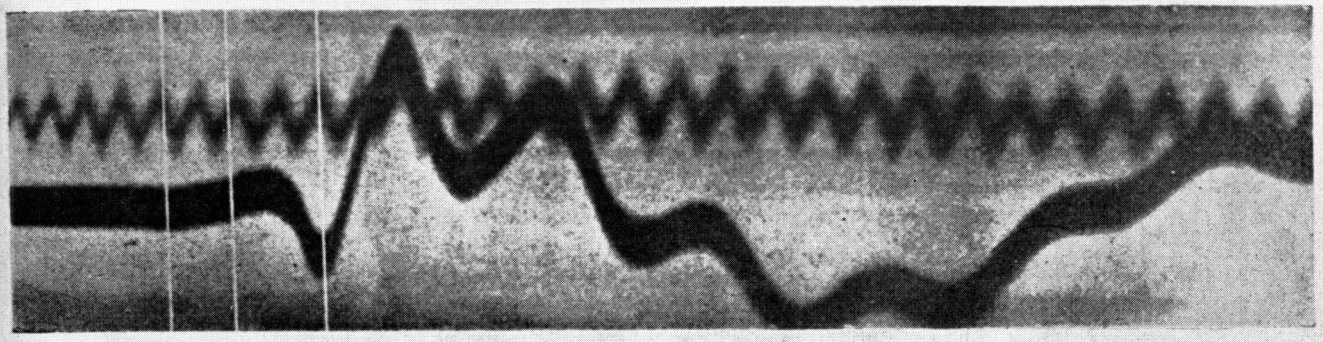
The Lee-Enfield rifle barrel vibrates in such a manner as to reduce the differences in height between the points of mean impact of ammunition with different velocities. For example, a Lee-En-

(Continued on Page Seven)



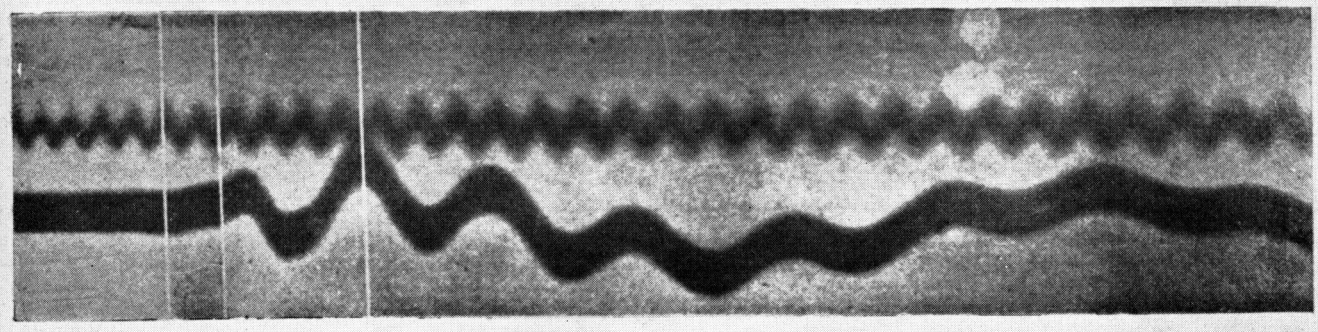
α β γ

FIG. 1.—Curve of vibration of a point $\frac{3}{8}$ inch from the muzzle of German Mauser, 1871 pattern. Full charge.



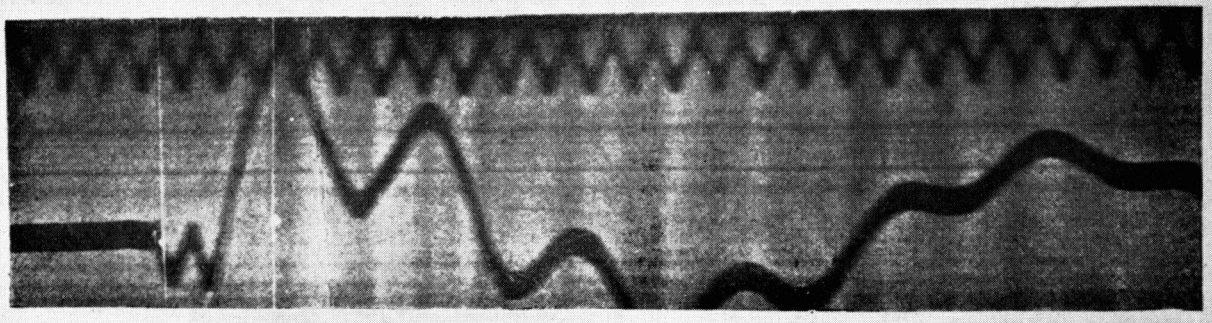
α β γ

FIG. 2.—Ditto. Half charge.



α β γ

FIG. 3.—Ditto. Quarter charge.

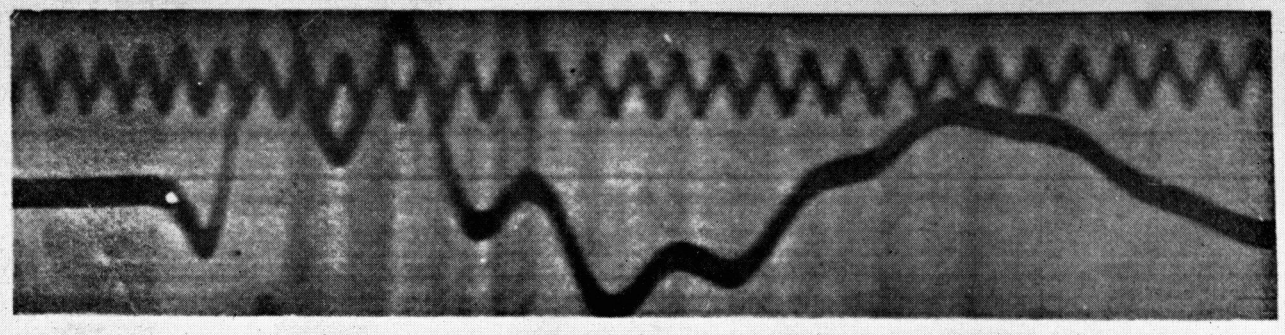


γ γ′

FIG. 4.—Curve of vibration of a point close to the muzzle of the German, 1898 pattern rifle. The rifle was clamped in cork. Spark γ′ when the bullet arrived at 4½ metres from the muzzle.

[To face p. 212.

PLATE IV—*continued.*

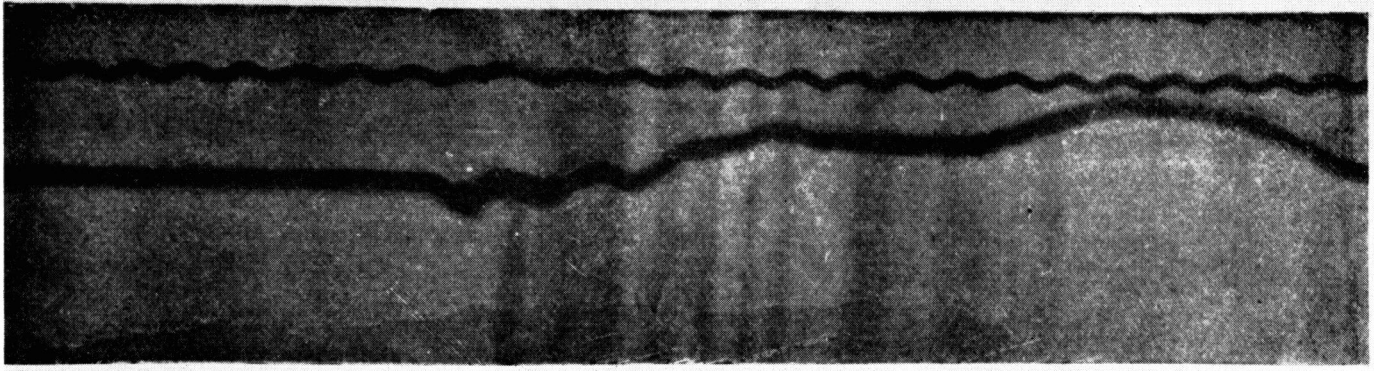


γ

FIG. 5.—Curve of vibration of a point close to the muzzle of the Spanish Mauser. The rifle was clamped in cork.

γ

FIG. 6.—Curve of horizontal vibrations of the barrel of the German Mauser, 1871 pattern, when held by an artificial wooden rifleman.



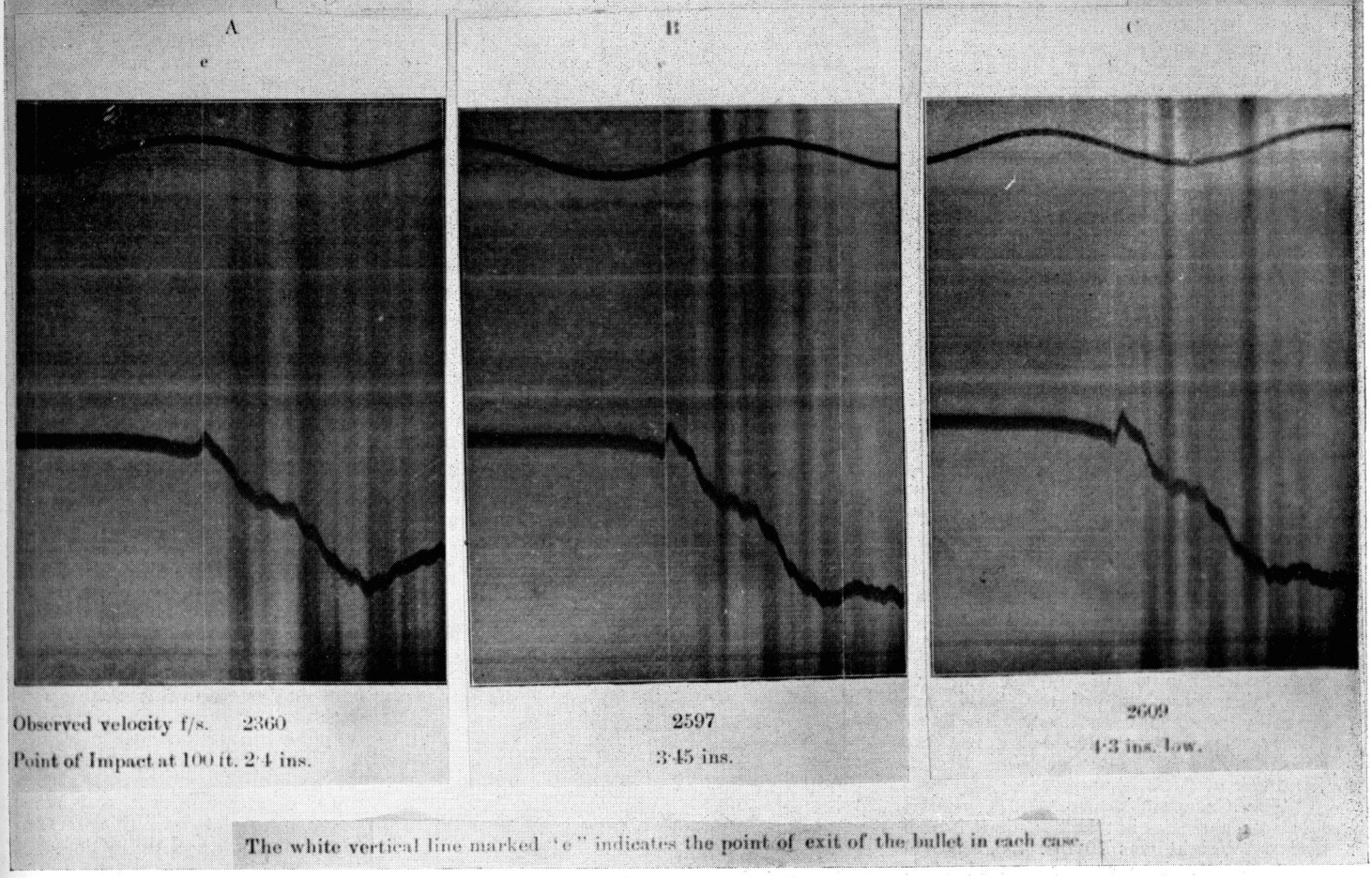
γ

FIG. 7.—Ditto, with the bayonet fixed.

[*To face p. 212.*

PLATE V, PART II.

BARREL VIBRATIONS WITH .303 SHORT RIFLE MARK I



Observed velocity f/s. 2360 — 2597 — 2609

Point of Impact at 100 ft. 2·4 ins. — 3·45 ins. — 4·3 ins. low.

The white vertical line marked "e" indicates the point of exit of the bullet in each case.

Barrel Vibration

(Continued from Page Four)

field rifle fired with ammunition giving 2,235 f. s. velocity, shoots 12 inches lower at 200 yards than with ammunition giving 2,000 f. s. velocity. At 390 yards range the points of impact with both classes of ammunition are at the same height. At 1,000 yards the 2,235 f. s. ammunition shoots 7 feet higher than the other. We see, therefore, that the bullets of the high velocity ammunition leave the barrel when the muzzle is at a much lower point in its curve of vibration, and therefore shoot low at 200 yards, but their trajectory being flatter than that of the 2,000 f. s. ammunition, it crosses the trajectory of the latter at 390 yards range, and keeps above it at all other ranges.

In designing a new rifle endeavour should be made to so arrange the length of the barrel, the strength and weight of the parts, and the method by which the recoil of the barrel and body is communicated to the stock, so that the barrel is in the middle of an upward vibration when a bullet with normal velocity leaves the muzzle; for then a bullet with higher velocity will leave the muzzle when it is pointing lower; and a similar compensation to that which occurs in the Lee-Enfield rifle will take place.

The 2,235 f. s. ammunition would have shot 4 inches higher than the 2,000 f. s. ammunition at 200 yards had the jump of the rifle been the same with both classes of ammunition. The lower jump, therefore, causes the 2,235 f. s. ammunition to shoot 1 foot 4 inches lower than it should have at 200 yards. At 1,000 yards the effect of the negative jump is 1 foot 4 inches X 5=6 feet 8 inches. This, added to the 7 feet, which is the height of impact of the 2,235 f. s. ammunition above that of the 2,000 f. s. ammunition at 1,000 yards, gives 13 feet 8 inches as the total difference in the heights of the points of mean impact which would have occurred had the vibration of the barrel and the angles of departure been the same with the two classes of ammunition. Hence we see that the vibrations of the barrel completely compensated for a difference of 235 f. s. in the velocity of the two lots of ammunition at 390 yards range and at 1,000 yards reduced the difference between the heights of the points of mean impact from 13 feet 8 inches to 7 feet.

Plate V, A, B, and C, shows the result of recent experiments at Enfield with the .303 short rifle, Mark I, and a similar apparatus to that described above.

These photographs show that the higher velocity bullet leaves the muzzle at an earlier point on the vibration curve, and that if the point of exit is lower on the curve, the point of impact is lower although the velocity may be higher.

Figs. 6 and 7, Plate IV, represent the horizontal vibrations of the barrel; these were measured in the same manner as before, the apparatus being erected vertically instead of horizontally.

The body of the rifle, being cut away on the right side to enable the cartridge to be ejected, is unsymmetrical, and weaker on the right side than on the left; this gives rise to lateral vibrations, which cause the rifle to shoot to the right or left. Also, the bolt handle projecting to the right is unsymmetrical, and causes lateral vibrations. Cutting off the bolt handle of the Lee-Enfield rifle makes the rifle shoot .46 inch to the right at 100 feet. This is the result one would anticipate, for cutting off the bolt lever throws the centre of gravity of the rifle more to the left, and the further it is to the left the greater the tendency of the rifle to revolve round the centre of gravity, with the muzzle travelling to the right.

In Messrs. Cranz's and Kock's experiments it was found that a Mauser rifle with a right-hand body and bolt, shot to the right and vice versa. The ordinary right-hand Lee-Enfield rifle however, shoots to the left, necessitating the foresight being placed .02 inches to the left to correct the shooting.

When Morris tube cartridges, or the small cartridges used with Molyneux adapters, are fired from a Lee-Enfield rifle, they cause but trifling vibrations, and do not need this lateral displacement of the foresight, therefore these cartridges shoot to the right.

Black powder .303 cartridges having a velocity of 1,850 f. s., produce different lateral vibrations from cordite cartridges, when fired in the magazine Lee-Enfield rifle, the body and bolt of which is unsymmetrical. At 100 feet range the black powder shoots 1⅜ inches to the right of cordite; but in the symmetrical Martini-Enfield rifle the shooting of these two powders does not differ in direction.

Any unevenness in the bearing between the lugs on the bolt, and their seatings in the body, influence the lateral vibrations. In the Lee-Enfield rifle, if the left lug takes the greatest strain on firing, the rifle shoots to the right and vice versa. It is important therefore that rifles should be used with their own bolts, the lugs of which have been made to take an even bearing by the proof charge.

On firing a rifle with the bayonet fixed, the weight of the latter impedes the vibrations.

In Fig. 6 without the bayonet, the

(Continued on Page Eight)

Barrel Vibration

(Continued from Page Seven)

bullet leaves the muzzle, when the latter has vibrated nearly twice as much as it has in Fig. 7 with the bayonet fixed. The Lee-Enfield rifle with bayonet fixed, shoots to the right, as the full allowance given by placing the foresight .02 left is not required, on account of the vibrations having been checked.

Fixing bayonets also affects the vertical vibrations, and usually makes a rifle shoot low.

From what has been said with regard to the movements of the rifle, it will be seen that "jump" is the combined result of the upward rotation of the rifle about its centre of gravity and the vibrations of the muzzle of the barrel.

The method of practically determining the jump is illustrated by an example in Chapter V, page 239.

There remains the twisting movement of the rifle about its axis to be mentioned.

This movement does not appear to be of much importance; still, there is no doubt a slight rotation of the rifle in an opposite direction to the projectile; for as the bullet passes down the bore and is forced to rotate by the rifling, the bullet endeavours to rotate the rifle by pressing against the driving edges of the rifling. Its want of success is due to the fact that it is only 1/300 the weight of the rifle, and has a smaller radius of gyration. The vibrations of the barrel are probably affected to a small extent, by this reaction between the bullet and the rifling. (End of quotation from British Textbook of Small Arms)

The German Mauser 1871 pattern rifle was a single-shot bolt action breech loader. Weight was 10 lbs. 4 oz., barrel length 33.46". The caliber was 11 MM. (.433") and the full charge load consisted of a 386 grain lead bullet and 77 grains of black powder giving a muzzle velocity of 1427 feet per second. I assume that the half charge and quarter charge referred to consisted of the same bullet with the charge of powder reduced to one half and one quarter respectively.

The Lee-Enfield is, of course, familiar to our readers and the ammunition used in the tests illustrated by Plate V was presumably loaded with the 174 grain service bullet.

The simplicity of the method used by Cranz and Koch in their experiments intrigues me and I can see no reason why these tests do not prove beyond any doubt that vibration **does** occur in rifle barrels during firing. The primary vibrations and the overtones are clearly shown and these vibrations undeniably affect the flight of the bullet. It is also evident that the effects of vibration on the flight of the bullet depend on many factors. These, include weight and shape of barrel, method of stockings, weight and configuration of action, method of support of rifle, weight and velocity of bullet, fit of bolt and action to one another, variations in bullets from shot to shot and others including even the type of powder used and the rate of ignition. In one of Fremantle's books he details an experiment in which the velocity of the black powder charge in the Lee-Metford rifle was duplicated with a charge of cordite. The rifle did not shoot to the same point of impact, but consdierably to one side. He ascribed this to the difference in the burning rates of the powders and the Lee-Metford action with its bolt head projecting to the side, as the energy developed was quite similar.

I do not have the technical background of either of the writers in the October issue. I have great admiration for anyone who can set up a theory and make a mathematical analysis as Mr. Grigg has done and I hesitate to offer any criticisms. I do not wholly disagree with his theories for I am inclined to believe that barrel flip or jump is the deciding factor in most modern, high-velocity rifles with present day barrel configurations and present day actions. From some practical knowledge of mechanics and a considerable amount of reading of technical gun literature I question if Mr. Grigg has taken all factors into account. If I follow him correctly, in using his equation for whip motion he uses "average pressure on the bolt face, this equaling twice the muzzle energy divided by the volume of the bore." It would seem to me that whip is more nearly related to total energy imparted to the rifle than to energy of the bullet, which is quite a different thing.

From information in the 1929 issue of "The British Textbook of Small Arms" the total energy available from the cordite charge of the MK VII cartridge is 7,320 ft. lbs. Of this the bullet at its exit from the muzzle represents only 2,300 ft. lbs. Heat represents 2,405 ft. lbs., recoil of the rifle 11 ft. lbs., energy of the powder gas (which must also be considered as a projectile traveling down the barrel) as the bullet leaves the muzzle 254 ft. lbs., bullet friction in the barrel 260 ft. lbs., rotation of the bullet 35 ft. lbs., the balance of the energy of the powder charge is accounted for by the muzzle blast. Cranz and Roethe in Germany made experiments that resulted in similar figures on the distribution of the powder energy.

Also, wouldn't the jump (and the vibration of the rifle barrel) be influenced by peak pressure and not average? Isn't the rate of application of importance; that is a greater blow and more jump and vibration from a fast burning powder than a slow one giving the same muzzle velocity? The effects of this could in some measure be offset by lower barrel time.

Perhaps Mr. Grigg and Mr. Friesecke will enlighten us in regard to these questions.

HOW TO USE A CHRONOGRAPH

By Edward M. Yard

When most shooters think of chronographing, they do so in terms of checking out their pet target, varmint or hunting load to see how it does. At most they have in mind determining the velocity of a handful of cartridges and loads. When these fellows come to the test range, they never have more than five cartridges of any load with them, usually two or three, sometimes only one! Since all of these people are not eternal optimists, this must be misconception.

This approach to a chronograph misses the point entirely (and if that single cartridge misses the screens, the whole expedition is lost). For one thing, a couple of shots reveal only the general velocity level of the load; it takes five or more to get a reasonable average. For another, the idea that the utility of velocity measurement lies in testing existing loads, as a secondary check, after the fact curiosity, to see if what the fellows say is right, is very far from the mark. At this rate, it is more sensible to buy a few handbooks and stick close to accepted loads. A chronograph won't be worth much to that man and that may be why rather few shooters have been willing to buy one.

The greatest utility of the chronograph lies in its application to developing the best loads. Components should be brought to the test range and their effects upon loads determined. Load development undertaken from this angle takes on new dimensions. Confusion and doubt may be replaced with certainty. Sifting a half dozen good loads out of as many powders, two or three primers, and three or four bullets can be accomplished with dispatch, and with almost complete knowledge of what you are doing as you go along. I say almost because there will always be something we do not know or understand. But load development using a chronograph is a new and delightful experience, a fresh world of shooting pleasure where facts focus clearly.

It should be obvious that components vary both from batch to batch in their characteristics and in their suitability for a particular task. It should be obvious, too, that with the wide choice of components, finding the right combination without some positive means of evaluation would be frustrating and time consuming. Velocity measurement is the very best means of positive evaluation. This is not to say that the velocity of a load is paramount. Rather the relative performance and the uniformity of velocity is the key, and the ability to measure these is the secret of successful load development.

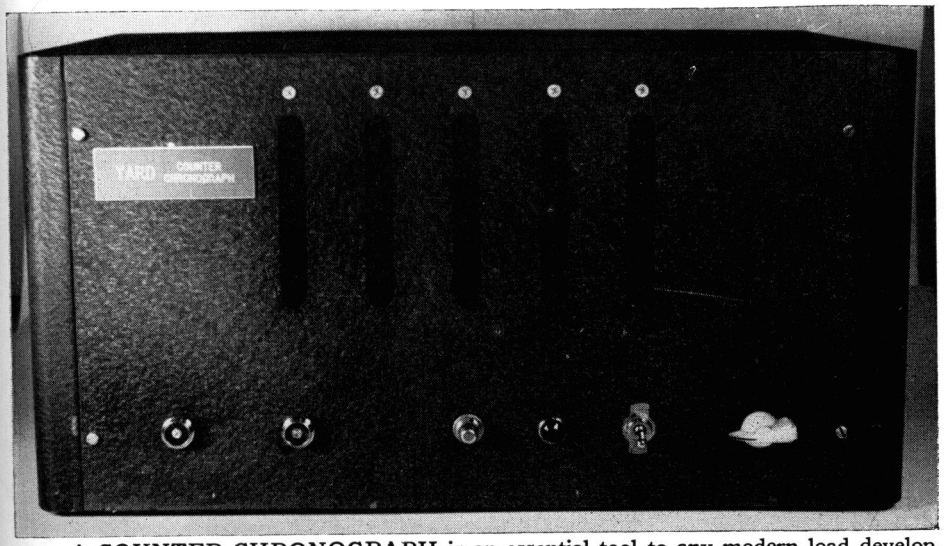
Lets get down to facts about load development. First we need some accurate means of measuring bullet velocity; a chronograph. Next, we need to have a plan and to keep a record of results. A notebook is important; every shot fired must be recorded and all pertinent data written down. Any item may be pertinent; make a record of everything. The plan is a systematic investigation of the performance of components in a particular cartridge, primarily the powder.

In the event we have a real Wildcat with no previous data available, let's start off with a low charge of the propellant selected, judged from some similar capacity cartridge. This will give a result. If very much below expectation and with no sign of pressure, increase the charge in uniform steps. Velocity should increase about as fast as the charge weight goes up. If it does not, then the loading is wrong, or some other component is not as it should be. A change in case, primer, lot of powder, bullet, or barrel will affect the velocity, but the major influence is the powder charge. A powder which burns completely in a cartridge yields so much energy, and that produces a certain amount of thrust on the bullet. This is a way of saying that for efficient charges, velocity is pretty much a matter of powder weight.

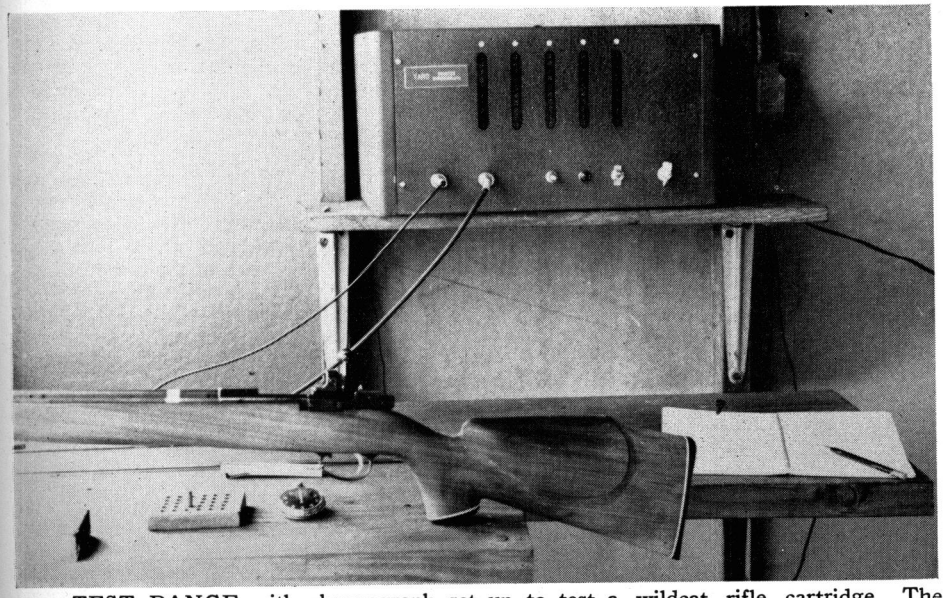
Fire a few shots of various charges. A fair idea can be formed of the final results to be expected with this powder and the other components. This can be done in a few minutes, and represents the initial survey. You will already have quite a bit of information, and the novice at the load development game may even think the job is done. It is only started, really.

Now is when we begin to work according to plan. We can see from our preliminary tests what range of powder charges should be explored. We will want, too, to check different primers, different bullets, etc. It is important to determine the approximate maximum safe load of each powder for each bullet and primer used.

List a graduated series of charges, and load and fire at least five cartridges of each, keeping all other components and conditions constant. If the loading can be done at the range, then the last is easy. Start with the lightest charge in the series, and work forward to the heaviest. You can then stop when a single round shows pressure. You will have rather accurate velocities for the load chosen, and can now check the same loads with another primer. Switch primers with one of the loads, keep-



A COUNTER CHRONOGRAPH is an essential tool to any modern load development program. With a time base accuracy of .005% and a resolution of one hundred thousandth of a second, velocity can be measured to a small fraction of a percent. While velocity is not the most important characteristic of a load, it is still essential to know what it is if any organized load development program is to be carried out.



TEST RANGE with chronograph set up to test a wildcat rifle cartridge. The permanent bench and range facilities make for ease and convenience of testing even in weather less than ideal. Any serious worker should have adequate range facilities and essential equipment, such as the accurate counter chronograph shown here.

ing everything else the same. Always do this on the same day, or refire the standard load just before switching primers.

Two things may be involved if you find a difference with another primer. The primer may be stale or it may be different. You won't be able, necessarily, to tell which, but you will find which of the primers you should use in developing further loads. Pay particular attention to uniformity of velocity. Use only primers from the same lot. Otherwise you will not know which component is controlling the result. This may sound like a lot of monkeying around, but unless you do establish basic comparison data for a cartridge, you will be unable to understand and evaluate your later work. Remember, you will want to compare loads with other powders to this one. This can only be done if you have enough information to know what you are doing.

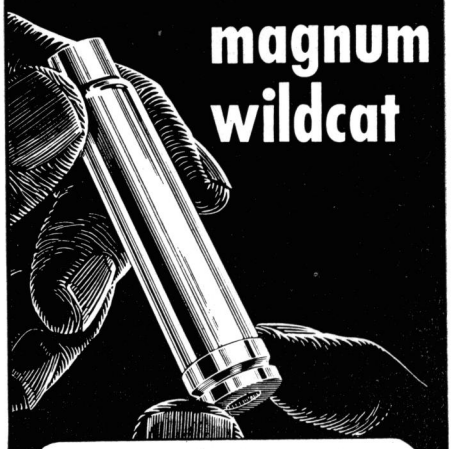
The next step is, of course, to keep everything else the same, but change powder. The same preliminary loads will again allow you to establish the proper loading range for it. Again you will need to fire at least five rounds of each load you have chosen to test. After doing this with the most likely powders for that cartridge, you will now possess a good fund of comparison data. A study of these results may lead you to believe one of the powders tried did not reach full potential, and you may wish to try slight variations up or down in some of the maximum charges for best results. Record and tabulate every load. Also plot the readings.

Now you are ready for the next phase. This is to try every available possible powder for preliminary results. From this survey you learn if any other propellants offer previously unsuspected possibilities, or rule them out entirely. A powder much too slow for a case will give low velocities, probably erratic, and thus is of little use. Others will develop obvious signs of pressure. You can thus eliminate them from further consideration, because you already know what velocity you can actually get before they become dangerous.

Should any explosive show promise, it should get the full test treatment, and be added to your other reference data. You are now prepared to try all available primers with one of your good loads of a few powders to learn if you should be using a different one from the make and lot that

(Continued on Page Twelve)

the norma man tames the .308 magnum wildcat



"For more velocity, I've tried necking, fireforming and altering .30 caliber cases for years," he says, "but not any more. The brand new .308 **Norma** Magnum unprimed case is just what this handloader ordered . . . and I'll bet a lot of others will feel the same way!"

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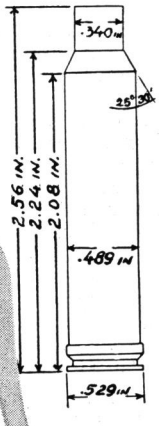

Based on the standard .300 Magnum case head, the .308 **Norma** Magnum unprimed case fits .30/06 length actions and gives greatly increased power with a wide variety of .30 caliber bullets.

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Individual annual dues $5.00 (includes magazine subscription for membership term). Associate member (wife or husband, son or daughter under 18 years of age, of member in good standing—no magazine) $2.50. Life membership, $75.00. Annual club affiliation fee $10.00.

EASTERN REGION WINTER MEETING

The annual winter convention of the Eastern Region, NBRSA, Inc., will be held at Elmira, New York, January 28th and 29th, 1961, in the Mark Twain Hotel. This date has been advanced in the hope of missing the middle of February snow storms that we have had for the past three years, and of getting the match schedule out earlier for advertising.

All clubs planning to conduct matches for the coming summer should have representatives at this meeting in order that a firm schedule for the season can be made.

All Eastern Region members are urged to attend and members of other Regions are most welcome. There is no doubt that this meeting has contributed greatly to the success of the Eastern Region, so plan to attend, bringing your ideas and criticism so that your officers may know what the majority desire and a program in the best interest of our sport may be devised.

Robert W. Hart
Director, Eastern Region

SOUTHWEST REGION NBRSA SHOOTERS PLEASE NOTE

The newly elected Director of the Southwest Region, NBRSA, John B. Sweany, 187-A Silverado Trail, Calistoga, California, is ready, willing and anxious to do everything he can to assist in promoting more bench rest shooting and more bench rest shooting facilities in that Region, but he needs to know who the interested shooters are and what classes of bench rest competitive shooting they are most interested in.

He would appreciate having all interested shooters and clubs in the Region, whether presently NBRSA members or not, contact him by letter or postal card and let him know their interests. States in the Southwest Region are Arizona, California, Nevada and Utah.

NEW BENCH REST RECORDS

A copy of the report of the NBRSA Judging Committee Chairman, Henry W. Barton, dated November 28th, lists the following new records recognized by that committee.

Heavy Varmint Rifle: 5 shots at 200 yards—.359 inch. Fired by Arthur J. Freund of St. Louis, Missouri, at the Nine Ring Sportsman's Club match in West Alton, Mo., August 28, 1960.

Heavy Varmint Rifle: 5 shots at 100 yards—.17 inch. Shot by Edward M. Shilen, Dryden, New York.

Heavy Varmint Rifle: 5 shot 200 yard aggregate—.3613 minute of angle. Shot by Edward M. Shilen.

Heavy Varmint Rifle: 5 shot national match course aggregate (five matches at 100 yards and five matches at 200 yards)—.3689 minute of angle. Shot by Edward M. Shilen. (Shilen's records were all made at the Dryden Fish & Game Club match in Dryden, New York on September 11, 1960.)

Unrestricted Bench Rest Rifle: 5 shot 200 yard aggregate—.2602 minute of angle. Shot by Clyde Yockey of Apollo, Pa. at Staunton, Virginia on October 8, 1960.

BENCH REST MATCH REPORTS KANSAS CITY, KANSAS

The Mill Creek Rifle Club of Kansas City, Kans., held its last match of the 1960 season on October 15th; a night shoot with ten shooters competing. Dixon Herman of Omaha, Nebraska, made a clean sweep of all three aggregates as well as firing small group (.515 inch) at 200 yards. H. E. Powers of Okmulgee, Okla., fired small group (.285 inch) at 100 yards. The shoot was for unrestricted bench rest rifles over the National Match Course. The high aggregates were:

	100 yds.	200 yds.	NMC
Dixon Herman	.3496	.4113	.3804
H. G. Baucher	.4410	.4593	.4500
H. E. Powers	.4672	.4772	.4722
H. W. Barton	.3708	.5933	.4820
John Mayer	.4468	.5651	.5059

ALLENTOWN, PENNSYLVANIA

The group in the Allentown, Pa. area who fire a season's program of non-registered bench rest matches with both .22 Varmint rifles and larger bore Sporter rifles on the Guthsville Rod and Gun Club range, report the following winners for their last two matches of the season. In this program each shooter fires two 5-shot matches at 100 yards and the smallest group fired is the competitor's record group.

For the October match, Bill Blose was winner in the .22 Varmint class with a .256 inch group and Larry Nuesslein was second with a .356 inch group. Nuesslein won the Sporter class match with a .965 inch group.

In the final match of the season, Nuesslein won the .22 cal. event with .436" and Fred Welty was second with .454". Nuesslein also won the larger caliber event with a .854" and Dr. William Fox was second with 1.039".

Aggregate winners at Mill Creek Rifle Club October bench rest shoot. Left to right are: John Mayer, Kansas City; H. W. Barton, Wichita; H. E. Powers, Okmulgee, Oklahoma; H. G. Baucher, Kansas City; and Dixon Herman, Omaha, Nebraska.

End of official National Bench Rest Shooters Association, Inc. section.

A NEW RIFLE ACTION

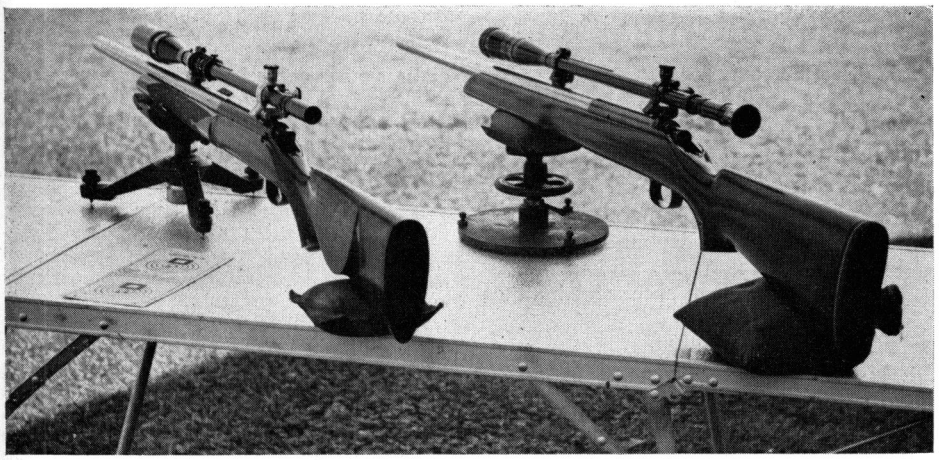
After a season's experience in competitive shooting bench rest in the Varmint Rifle class in 1959, Edward Shilen, a gunsmith in Dryden, New York, became dissatisfied with available rifle actions. During the winter of 1959-60, he designed a new bolt action. He and his shooting buddy, Ross Sherman made up two actions and built up two rifles for NBRSA Heavy Varmint Rifle competition which they used during the 1960 season with very consistent match winning success. Shilen established three national records in the heavy varmint rifle class in September and Sherman did even better shooting at an unregistered match in Facett, Pa. The two rifles are shown in the illustration, Shilen's on the left and Ross Sherman's on the right. The disassembled action is also illustrated.

Features of the new action, as pointed out by Shilen, are:

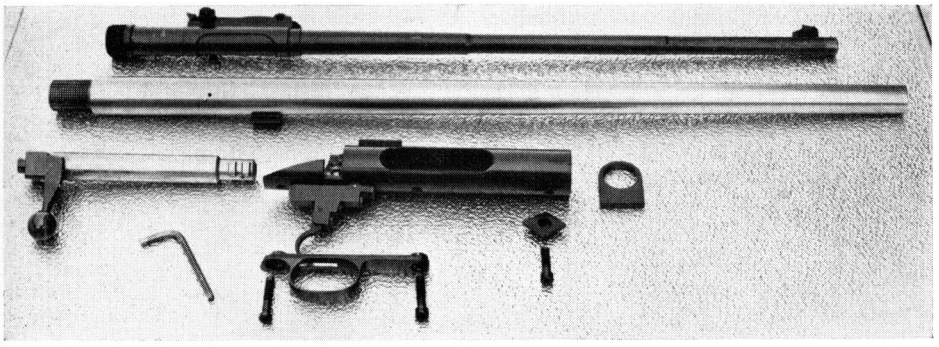
The receiver is cylindrical inside and out. Theoretically, this makes the stiffest possible receiver.

The receiver is solid except for a ¾ inch wide loading port and the cut for the bolt handle.

The receiver has a thread length of one inch. A Mauser '98 barrel is shown beside the Hart barrel to give a graphic example of the difference in thread length.



Two heavy varmint rifles built on the Shilen custom actions.



A dis-assembled Shilen custom rifle action.

The receiver has three guard screws and a large size recoil lug.

The receiver is made to use Mauser triggers, giving the shooter a wide variety of triggers to choose from.

The bolt has four locking lugs which lock horizontally in the action instead of vertically, as is customary.

The firing pin has a short, fast fall with uniform ignition.

Bolts are made for two sizes of case heads; .222 or .30-06.

Receivers are long enough to take cartridges from the .222 up to medium length cases like the .308 or .244.

The bolt heads are of the counterbored type completely enclosing and supporting the head of the case.

Although these actions were originally designed for varmint class rifles, they are entirely suitable for unrestricted class bench rest rifles, Free rifles, and any other type of rifle which does not have to be a repeater.

These actions have proven successful enough that they are now being produced for sale and it is stated that they are now available for delivery to individual shooters or gunsmiths. Further information may be obtained from Edward M. Shilen, R. D. #1, Dryden, New York.

PHT

Dear Phil:

The benchrest rifles have been tucked away as the hunting season goes on and I suppose I am like many of the other rest shooters in my concern as to whether or not such long sessions at that type of shooting adversely affect my ability to hold steadily off hand and shoot quickly at running game. I think I am willing to concede that perhaps there is a slight tendency to hesitate at a moving game target but that is made up for by a determination to hit the animal in a more vulnerablt spot. Three times this year I changed my point of aim at deer to a location which I felt would make an instant kill and spoil less meat. The first time worked out fine but on the second occasion when I shifted from a body shot to an under-the-chin position, the deer was a little too far off and moving a little too fast and I retained the definite sight picture of the center of the reticule being a little too far to the side of the deer's neck. The deer went down for a second before it disappeared in thick, black growth. I immediately found blood signs and after the usual wait, followed it carefully until dark when I had to leave it in the swampy area and return to camp by compass and flashlight. By the time I got to that deer, a bear had beaten me to it and partially buried it. He came back on several occasions to eat heartily but I wasn't fortunate enough to see him.

You probably heard some of the stories of the second gathering of the benchrest shooter's hunt in Maine this year from Bob Stinehour and although we did not have as many hot discussions about benchrest problems, we did think frequently of those fellows with whom we shoot throughout the summer. This year's event was neither as large nor as long as last year's but we did hunt in some interesting new country that only this year was opened up to the public. We found an active beech ridge that was being worked by both deer and bear, and in the light snow, we could clearly see that one or more bear were passing for three successive days at just about the spot where we parked the car. A young fellow from the Cape who occasionally shoots benchrest named Curtis had rather an interesting experience one day on this ridge. He carefully worked up to it on an old wood road and in the still early morning air, could detect the sound of leaves being pawed. Each time the sound was strong, he would take a few steps forward and then stand still until the sound reoccurred. He had about reached the point where he thought he should see something when he distinctly heard a grunt a little in front of him to the left. The wind was favorable and he thought he would take a few more steps when his chance occurred when he heard another grunt off to his right. Carefully watching the wind and listening to the sounds, he tok a few steps forward in back of a recent blowdown. As he stood quietly there, a big buck suddenly got up from the other side of the blowdown with such noise and alacrity that Curtis was too startled to shoot at either the buck or the two bear that immediately decided that another beechnut ridge was a better place for breakfast.

I have heard many interesting stories about deer following in a person's footsteps and once shot a buck who was obviously tracking Merrie Stuhlschuter, in a light snowstorm. Curtis' companion was an Air Force boy named John Spencer and I think it was the very morning of the bear episode when John walked down the lumber road in search of a trail into the ridge. He recognized that he had gone too far and turned and retraced his steps. Just before he entered the deeper woods, he was surprised to see a party of several other hunters with guns alerted, waving to him, to signal that there was a deer on the other side of the road. As one of them caught up to him, he told John how they had come over the hill just in time to see a buck step across the road and follow for quite a distance in John's footsteps as though the buck knew that John was directly in line with their fire and prevented them from shooting. Before John turned again, the buck had jumped into the thick growth.

Long columns are written about testing a rifle before going into the woods, but I had a cabin mate this Fall that didn't heed the good advice that was written. He has a very nicely sporterized Krag that in years past has taken deer at some long ranges. The ivory bead sight broke last Fall and he tapped out the sight, intending to get a replacement. Like many of us, he procrastinated until several days before this years' hunting. He wasn't able to get a new sight of the proper height before entering the woods and didn't take enough ammunition to properly resight it. One nice afternoon, he came upon a likely looking beech ridge and thought what a fine place for deer to come along. As a matter of fact, a thick covering of leaves and a little high place on the ground looked so good that he lay down in the sun and comfortably looked down the ridge with his head resting on his hand. He hadn't assumed that position for five minutes before two doe came in sight and pranced to within thirty feet of him. By that time, he had merely rolled over to take a good steady prone position with point of aim at the neckbone of one of the deer. The deer stumbled but went off at full speed but he had seen many a deer do that before when hard hit, so he fired at the other doe. He figured that the buck might be showing any minute so before hollering for assistance from his shooting partner, he went down to see if one or both of them were lying dead just over the rise. He had been so sure that he hit those deer that he patted his old Krag and said, "Nice old girl, I guess you deserve a stock refinishing job this winter." He didn't find hair or blood

(Continued on Page Twelve)

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STOOL SHOOTIN STUFF

(Continued from Page Eleven)

at the spot where the first deer stumbled but at the location of the second deer which hadn't fallen, he found a long furrow in the leaves, directly under the spot where the deer stood. A careful search showed that the first bullet had furrowed the ground, and so I now think that he will be much more careful in targetting his rifle in the future.

Because of a slight change in date of the stoolshooters hunt, I found myself a little crossed up in plans for the hunting season and had to leave the crowd before Armistice Day to be on hand to receive guests who were to join me in the far northern area that I hunt. This unfortunate situation caused me to miss seeing Ed McNally whom I didn't even know was East until I got to the Rangely area and met Doc Garcelon. Rumor has it that he may be back to his old locale before next hunting season occurs. I'll be one of his many friends who will enjoy having him around this area again.

Harvey Donaldson regaled us through the evening with many interesting tales. He sent me a new red bow tie, made by his careful touches, with firm assurances that when wearing it, I will be quite proberly attired as a deer hunter. Maybe so, but I have avoided buck lures of other types; however, after all, perhaps a flashy red bow tie is to be preferred to some of those peculiar odors I see advertised.

One sees many pretty queer rigs in the woods, worn by people hoping to get deer, and I'll never forget one that I saw some years ago in my home state, when hunting near Plymouth. Plymouth has probably seen some pretty queer hunters since the first "four fowlers" were sent out to procure turkeys, ducks, geese and deer for the first Thanksgiving day. I once saw there an old timer with a shotgun, the barrel of which must have been at least four feet long, and on that same occasion, a friend and I came over the hill on a deer path to meet a crouching hunter wearing no red and a gray felt hat on to which was wired a deer skull and antlers. The fellow assured us that it was good camouflage, and by means of such a hat, he expected to sneak up closely enough to the deer so that he could hit it with a charge from his shotgun. As I think back over that occurrence, I am not sure but what such a fellow would still have missed the deer. As I also think back, I wonder whether he succeeded in discovering a unique method of committing suicide or whether he heeded our commands to take off such a rig and get some red on him as quickly as possible.

Each hunting season, I become acquainted with new potential subscribers to our magazine. It is surprising how often I pass out a copy and find that the fellow to whom I have given it has never heard of it. One such chap this year was a young Vermonter named Don Poland who is very interested in nice guns and reloading and varmint shooting as well as being a hunter. I don't know what his standing as a hunter was before I met him but when I talked with him at Stratton, he was about to return home after a very successful hunt on which occasion he got no deer, but did shoot six bear. In seasons before, he has carried a very accurate .270 but this year, took with him a new .243 Sako equipped with a 4X Bearcub scope. One bear got away but the other five succumbed to that little 85 grain bullet from the .243. They weren't big bear according to Alaskan standards and measurements but when three of them laid out on the back deck of his hunting companion's car, and two on his, I'll bet they attracted a lot of interest as they travelled from Maine to Vermont and stopped here or there for coffee or a sandwich. Perhaps I'll have a picture for you of these bear, but even if I don't, I hope to have a new subscriber to our magazine and a few new attendants at some of our benchrest shoots.

Goodwill is very important and I think of the pleasant experience last year when on a busy day at Stepping Stones, a chap and his family with their car loaded with camping gear dropped in to see me. It turned out to be H. L. Remmel of Fayetteville, Arkansas who was about half way through a long tour of the country to visit shooters and gunsmiths. How I envy him the good times he must have had on that trip, and now that he is back home again and re-started his gunsmithing business, he'll have a broad list of friends throughout the country because of that friendly tie that exists between one shooter and another. When I answer his recent letter, I will probably be only one of many to keep the ball of friendship rolling.

Well, Phil, Merrie and I will be off for a New Hampshire deer hunting trip in a few days where we expect to find it a good deal colder and snow on the sides of old Ragged Mountain that at least will tell us where the deer have been a few minutes or a night before. I have a friend who keeps saying "They are just ahead of us, boys" and indeed it is the truth.

Cordially yours,

Ernest Stuhlinger

How To Use A Chronograph

(Continued from Page Nine)

you have been testing. Sometimes decided differences are found, either in velocity developed or uniformity. In either case, by comparison to your standard loads, you will be able to tell what difference, if any, exists. I will repeat, when comparing primers, fire all loads on the same day to eliminate other variables.

All of this is very simple, but if not done carefully and thoroughly, you will not have proper comparison data and will fool yourself, as often as not, in evaluating results with new combinations. For instance, if you some day change both powder and primer and, say, get 50 FPS more velocity than from another load, until you check out the primer, you don't know which was responsible. You might assume that the powder is the cause, whereas it may be that the new primer with a previously used powder will produce a much better load, or let you get the velocity from a lower charge, perhaps at lower pressure.

With a good table of carefully checked loads, when you change bullet weights, and make similar accurate tests, you may find a different powder appropriate for best results, and more quickly discern this from a study and comparison of all of your data.

You will soon find yourself coming to definite conclusions about the merits of various powders, primers, bullets, etc., picking favorite loads, and feeling right about it because you know EXACTLY what they do in your gun, both as to velocity, uniformity and comparative pressure.

One friend who shoots a .45 Colt Single Action had for years been using two loads. One of these was a "heavy hunting load" of 18.5 grains of No. 2400 behind a 250 grain bullet; the other a practice load which he likes better, 10.3 grains of Unique behind the same bullet. He was amazed to discover that the chronograph found the Unique load going 1035 FPS while the 18.5 of No. 2400 only showed 960 FPS. He had been taking the wrong load to the woods. Regardless of anything in the books, **IN HIS GUN** with his lot of powder, etc., that "heavy" load just wasn't performing. With proper testing, he would long since have developed better loads than either one of these for his gun and components, and furthermore have the data he would need to immediately assess the merits of any other new idea that came along.

If this sounds like work to you, then you are not really interested in load development. If it makes sense to you, and you do much shooting, you need a chronograph.

NEW BOLT WELDING JIG

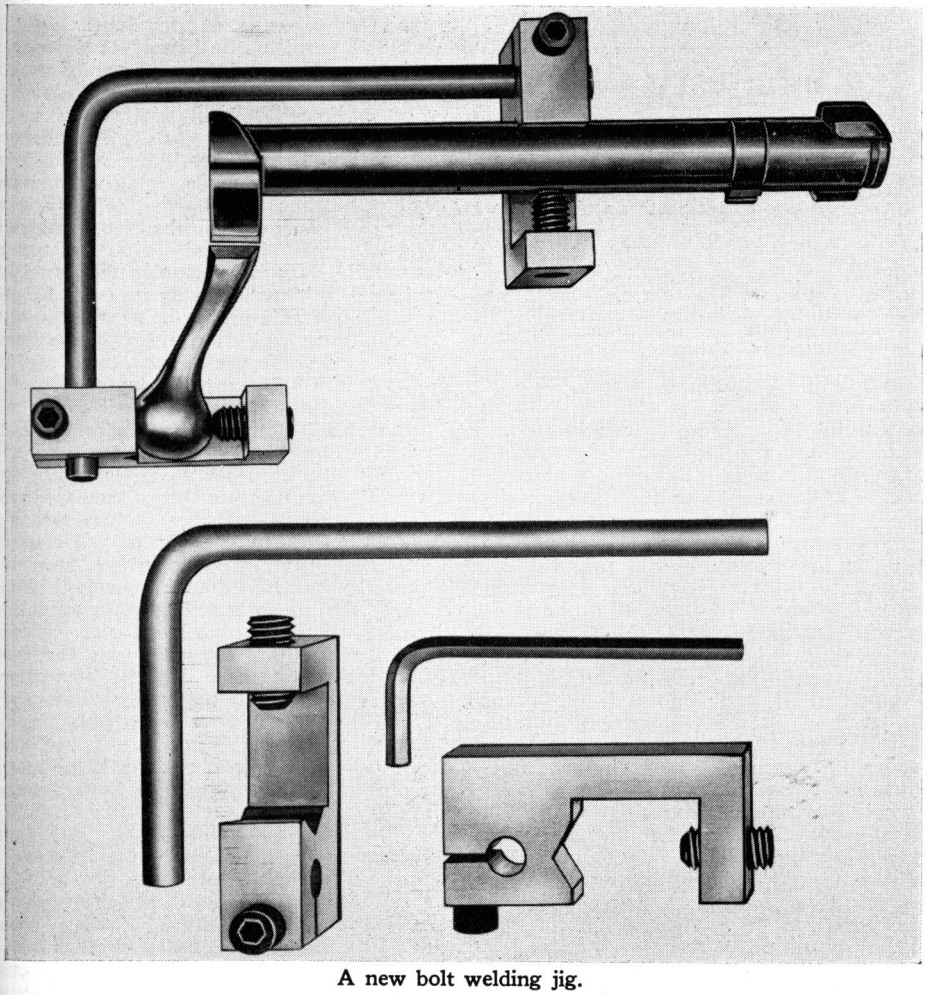
Bob Brownell (BROWNELLS Inc., Route 2, Box 1, Montezuma, Iowa) has come out with a new jig which will be welcomed by any gunsmith who has ever fiddled, fussed and fumed as he tried to align a forged bolt knob with the cut-off stub of a military bolt handle while altering the bolt for scope mounting. As the illustration shows, the new jig makes it possible to lock the forged knob and the bolt in precisely the desired relationship and hold them firmly while leaving adequate space to weld by either the acetylene or arc methods.

I have used the forged knobs ever since they came out, which I would guess is some ten or twelve years ago, and I feel that it is possible to get a much neater and better looking job with them as well as providing more clearance for low scope mounting jobs than it is possible to do by using the forging method with a set of shaped blocks. In the past, my technique, and I suppose that of most gunsmiths, was to lay the bolt body on a piece of firebrick after plugging the inside of the bolt for the rear ⅓ with wet asbestos. The bolt body was then packed and held in place with wet asbestos and the forged knob propped up on a ball of wet asbestos in proper relationship with the bolt body. Getting the two into proper alignment sometimes took quite a bit of time and then one incautious movement could upset the alignment and leave all the work to be done over again.

With the Brownell jig the bolt is placed in one end of the jig, as shown in the illustration cut. The jig is laid on a flat surface and the bolt lugs inclined at a 45 degree angle, checking the angle with a small protractor which is furnished with the jig. This gives the bolt knob the correct angle of attachment in one plane and then the correct angle in the other plane is taken care of as the forged knob is mounted in the other end of the jig and then the two clamped parts of the jig slid into proper relationships on the L-shaped rod. The inside of the bolt is packed with wet asbestos

before placing it in the jig and then the outside of the bolt in the area near where the welding is done is packed with wet asbestos to control the flow of heat.

The jig is simple and quick to use and at the $6.75 price for which it is offered by Brownell, any gunsmith who does any appreciable amount of bolt knob work can hardly afford to be without it. It will



A new bolt welding jig.

quickly pay for itself in the time saved in making set-ups.

While on this subject here is another tip which may be of help. After the new knob is welded in place, the joint must be shaped to smooth symmetrical lines and the knob polished. I have threaded plugs made up to fit all of the standard bolts and after welding I chuck the front end of the bolt in the lathe chuck, place the threaded plug in the back end of the bolt and run the lathe tailstock center into a center hole in the plug. Then I run the lathe at slow speed and with properly shaped lathe tools go in and just touch the sides of the original section of bolt handle right next to the bolt body and then face back out so that the excess weld is cut away leaving both front and rear sides of the bolt knob smooth, symmetrical and square to the axis of the bolt. This is much quicker and produces a much better job than trying to file or grind this section. The knob itself and the shank are then polished on a small loose belt sander.

A good welder with the bolt packed in wet asbestos can do the welding without drawing the temper on the cocking cam and, in the case of the Springfield bolts, on the extracting cam. If the temper has been drawn on these, this area should be reheated and quenched. The extracting cam on other rifles such as the Mausers is on the root of the bolt handle. In working and finishing this point, this section shou'd only be polished to remove any welding scale or discoloration and then the cam surface re-hardened.

Creighton Audette
Springfield, Vermont

HARVEY DONALDSON WRITES

Dear Phil:

No matter how much experience a fellow has in matters pertaining to shooting, every once in a while something comes up that makes us wonder if we really have all the answers.

I believe I told you, some time ago, about shooting through a big pine tree, that measures four feet through at the base, with my 7X57 light deer rifle. The load used at that time was the regular factory loaded Remington ammunition, having the 175 grain solid metal case bullet.

Last week, on our way into the woods on a deer hunt, Tony and I stopped at the same tree, and when I fired a hand load, with the same bullet, with 48 grains of 4350 powder, the bullet did not go through the tree. Now, I'm asking you HOW COME?

I have in my shop some 2000 rounds of factory loaded Remington ammunition, that was made about 1910, in 7X57 caliber. This ammunition by present day standards is under loaded, as it was made to use in the Remington single shot falling block action. This ammunition is still in good condition, and it may come as a surprise when I tell you the case necks of this ammunition were annealed, so there are no split case necks as appears on some other factory ammunition I have that was made about the same time.

This old Remington ammunition is loaded with 33 grains of Hercules W. A. powder and a heavy jacketed (1/16" thick) 175 grain bullet, having a velocity of around 2000 F. P. S. Cases are primed with a flat face nickle plated primer.

For those of your readers who have never seen any W. A. powder, I will go into a little more detail. It was brought out in 1898 by the Hercules Company and

(Continued on Page Fourteen)

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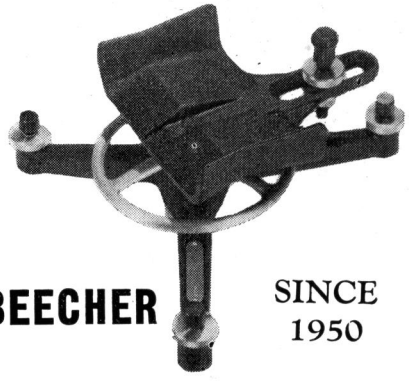

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Harvey Donaldson Writes

(Continued from Page Thirteen)

discontinued in 1930. It consists of black flat perforated discs having a diameter of .08" and around .045" thick. W. A. powder was named after or for Whistler and Aspinwall, who were the chemists who designed it. It was brought out to use in .30 Krag ammunition, with the heavy 220 grain bullets, and gave good results in this rifle from 1900 up until the time the 30/06 appeared on the market. This powder was quite errosive on barrels especially when a number of shots were fired that would heat up the barrel.

Now let's go back and examine my hand loaded cases as mentioned above. You might note that with the 48 grains of 4350 and the 175 grain full metal case bullet we obtain quite a powerful load in the medium capacity 7X57 case. To check on this, turn to page 33 in the November RIFLEMAN. Here we find that with the larger capacity .280 Remington case, with a load of 52 grains of 4350 powder and the 165 grain (not 175 gr.) bullet, one may obtain a velocity of 2698 F. P. S. To give you a better idea as to how well my own 7X57 rifle, with the 12 inch twist, compares with this .280 Remington, if you will look back through the older issues of PRECISION SHOOTING, you will note I am using about the SAME loads in my 7 m/m rifle that are shown in the RIFLEMAN for this larger .280 Remington case. Mister, the 7 m/m is a most efficient design. I would have you note, as well, that this factory loaded with SOLIDS (as the British call them) Remington ammunition is exactly the same ammunition that the English African hunter Bell used from 1900 up to around 1915 in killing over 800 elephant. He used just a plain English Mauser chambered for the 7X57 case.

Now, let's go back to the big pine tree. This tree stands at the junction of the Powley Place road where it joins the Arietta Road, just below the outlet of Piseco Lake, some 45 miles from my home. This tree may not seem large to those who live in a country of big trees, but when you consider it stands by the road-side of a country that has been stripped of most of the large standing timber, one wonders why this old timer was left standing. I can well remember, at least fifty years ago, when deer hunting around the lower end of Piseco Lake of walking past this old tree. At that time I was carrying a .30 Krag rifle. Having a few cases in my pocket loaded with the solid jacket 220 grain bullet (we used them for head shots), I fired one at the tree and the bullet went through the trunk with little trouble.

That may have been the reason Tony and I stopped at this same tree last year when I shot through the trunk with the 7 m/m Remington factory loads, having the 175 grain metal case bullets. So, last Thursday, when Tony and I again drove past the tree, Tony says, let's stop and see what your reloads will do. As before mentioned, they did not do so well. Now, this bothered me so much that Friday I got in the Corvette and drove up again to visit the old tree, a matter of some ninety miles. This time I had a few of those fifty year old Remington factory loads, and sure enough, every one fired drove the 175 grain bullets through the tree. My own hand loads with 48 grains of 4350 and the SAME bullets, pulled from the Remington cases, failed to go through the trunk.

So, I am still wondering what it is all about. Guess the moral to this tale is, that if you have any TREE shooting on your agenda, lay aside your modern high speed loads and use any old military ammunition you may have kicking around. You will find as I did that it will perform better.

I am just winding up my 65th year of deer hunting, and am glad to announce I have plenty of meat in the deep freeze. Tony and I had a wonderful trip deer hunting in Maine, out of Doc Garcelon's camp, but I had to get back into N. Y. State to fill out my license. Will have a lot of colored slides to show you if you visit me again during the coming Holiday Season.

Sincerely,

Harve

The Information Bench

The Information Bench service is available to all Precision SHOOTING readers. With your questions, send a stamped, self addressed return envelope for a reply. Selected questions and answers, covering as wide a variety of interests as possible, will be published in these columns. Address your questions to the following people.

Rifles, all types, accessorise, handloading, components and shooting methods:—R. W. Lathrop, The Information Bench, 3207-148th Ave. S. E., Bellevue, Washington.

Sporting handguns and loading—Kent Bellah, Saint Jo, Texas.

THE INFORMATION BENCH

Question: I go in for big bore shooting and would like a more specific explanation than the one I've heard to the question of flat base versus boat tail bullets at ranges up to 1000 yards. The stock reply is that the boat tail at speeds below the speed of sound, ranges out farther.

My load in .30-06 is 57 grains of 4350 powder with Match King 180 grain bullets, which I shoot at 600 and 1000 yards. I calculated my velocity as 1900 FPS at 1000 yards (2800 FPS at muzzle). Wayne E. Ash, Vallejo, Calif.

Answer: It is well known that a boat-tail bullet is of little advantage over the flat base bullet so long as they are traveling above the speed of sound, or above 1130 feet per second at sea level. I greatly doubt that you are getting 1900 FPS at 1000 yards. I believe that the tables show that a 180 grain bullet starting at around 2800 FPS will be down to about 1900 at 500 yards. I am quite sure that the boat-tail will give you some advantage from 750 to 1000 yards.

Since you load your own and shoot at the long ranges, I would suggest that you try identical loads, other than the bullet, and make up your own mind about the matter. The Army found, back about 1925, that the 172 grain boat-tail bullet, when fired at the proper elevation, about 33 degrees, would fly 1500 yards farther than the 150 grain flat base bullet started at the same speed. R. W. Lathrop

Question: Will you please give me the length of the .219 Don case? I wish to trim some new cases. W. C. Roberts, Parkersburg, W. Va.

Answer: There are several versions of the Wasp, and many reamer makers, and they do not all agree, especially on length. I like to measure the reamer that cut the chamber and then make my cases accordingly, about .010" less than the chamber. If I am forming new cases I like to leave them just as long as the chamber will take. When they are fired they will shrink a little owing to the brass having to fill out at the shoulder. It has to come from some place and if things are right the case will as a rule shrink in length ten to 15 thousandths.

I believe that the .219 Don Wasp was to be 1.750" in length. If you cannot measure the reamer that cut the chamber I would suggest that you trim the cases to about 1.760", fire one or two that have been lightly greased and then measure for a finished product of 1.750".

If you have trouble losing cases because of rupture be sure to anneal the neck and shoulder. A simple and safe way to do this is to hold the case by the rim in your thumb and finger and then heat the shoulder and neck with a small torch until red and then drop into water. If you do it this way you will never get the base too hot, which is important. You will let go before that happens. It works. R. W. Lathrop.

Question: Is there any apparatus or equipment (mechanical, optical, electrical or other) made or used for checking the straightness of a rifle barrel? I know that many rifle barrels are used and shot out, the bore of which never was straight. Frances James Wilson, Port Huron, Mich.

Answer: I note that you are in the gauge business and you very likely have listings of all such gauges made. I do not ever recall of reading or knowing of any such gauge. This is one job that the very highly trained worker has had to do without a tool. He does it by placing the barrel or tube where it can be easily turned and looking through at a proper light, sometimes a ground glass, and sometimes just a good North light. The shadows that can be seen in the tube reveal how straight the piece is. If a line or concentric circles are distorted and not true, they indicate a bend.

Not very many barrels are perfectly straight and it does not matter if they are not. There are other things that are more important than straightness. The accuracy with which the hole is drilled and reamed, how many tight and loose places, how uniform the size is and how smooth the surfaces are is what counts more. The famous Star Gauged barrel for the Springfield, many years ago, was one that had passed the test made by the Star gauge which measured the uniformity of the bore. Now days this is best done with the air gauge. Such makers as Hart gauge their barrels with the air gauge. It is too costly a process for the production manufacturer. R. W. Lathrop

Letters

(Continued from Page Four)

There are hundreds of these cheap, foreign war-surplus rifles floating about down in this section, and people who have never before owned anything but a shotgun are buying them like hot-cakes. This may be a good thing, for it will acquaint them with the use of a center-fire "full-bore" type rifle at less expense than it would be for them to buy a Model 70, or one of the Remingtons, or an imported FN or its counterpart. However, it is amazing what really little knowledge the average American shooter has of rifles and ammo to fit them. So far I have been pulling all sorts of split brass out of the various foreign military rifles that get into them by plain, stupid ignorance on the part of the shooters.

People shoot .30-30 WCF cartridges in the .303 British; the 7 m/m's in 7.65 m/m, and this is not so bad. Some work it the other way around, trying to shoot the 7.65 m/m's in some of the 7 m/m Mexican Mausers we have in the area. It really is amazing how little common mathematical knowledge the American has been exposed to. He knows absolutely nothing of the decimal system, meters and their divisions, conversions from Millimeters to inches or the reverse, and so on.

Here in Fayetteville (Arkansas) at the various sporting goods emporiums we have Finnish ammo in both .303 British and 7.62 m/m Russian calibers for sale; British, Canadian and Australian .303 ammo for sale; The Argentine 7.65 m/m ammo; foreign loaded .30-06 GI stuff, in addition to usual run of the Italian, French and other odd cartridges. It is either sold with the original service ball bullet, or with some replaced soft-point bullet for hunting. To the best of my knowledge it is all COR-

ROSIVE, but this is never noted nor told the shooter and they are rusting out barrels as fast as they shoot them. Of course that makes business for the gunsmith, but I would rather not get mine that way and warn all customers about the corrosive nature of all foreign military ammo, as well as all U. S. GI made before 1950 (except for carbine).

Sincerely,
Harmon L. Remmel

BULLET JACKET VARIATION

Dear Phil:

Bill Cotter's article in the October issue of Precision Shooting on the effect of jacket wall thickness variation on precision accuracy was of great interest. The difference in average group size per .0002" of improved wall uniformity was fantastic, and it is a pity that Bill did not go a step further and include a group of jackets from .0000" to .0002" variation for test. Plotting his data on graph paper and extrapolating, we estimate that had he done this his five-shot groups might have averaged somewhere around 0.10" to 0.15"—pretty respectable shooting!

Selection of jackets with a wall thickness variation of no more than a few ten-thousandths is a pretty rough proposition, in that ordinary wall micrometers, as Bill points out, are not positive enough. I wonder just how many shooters mike all their jackets in at least four different spots. In any event, we get a lot of rejects, and some, perhaps, which we think are OK may really be "clunkers" which later give us a wide shot. It would be nice if you could talk Cline Deere into sending you a sketch of his gadget for publication in the magazine.

The rolled copper sheet from which jackets are made can hardly be expected to have a uniformity to the ten thousandths, and after drawing etc. if anything the walls would be even less uniform.

Perhaps someone with mechanical ingenuity will eventually figure out a reasonably priced gadget to either line-ream or out-side turn our jackets to better uniformity, which will not only improve our groups but cut down on the rejects as well.

Sincerely,
A. H. Angerman
Wilmington, Delaware

ARIZONA SHOOTING JAUNT

Dear Phil:

Late in November a friend here in Tucson, knowing that I was interested in bench shooting, called me on the phone and told me about a shoot to be held at Phoenix on December 4th and also about a gun show that was to be held December 3rd and 4th at Scottsdale. I had dragged a few guns down here from Seattle, missed putting in lots of things that I should have, but am always looking for a chance to "bust some caps" so I decided to go to Phoenix.

Saturday morning about ten o'clock the wife and I headed the Bonneville towards Phoenix, 120 miles to the north west. We arived at Scottsville, a very unusual village that lies possibly ten miles north and east of Phoenix, just about one P. M. We had passed through a hard rain storm on the way up, the very first rain we had seen since coming here on Ocotber 20th. We had heard about the Lulu Belle restaurant and being of a desire to eat we went in and had a nice lunch and enjoyed the very different "atmosphere." Scottsdale is a very unusual town. Nearly all the stores are housed in old time frontier buildings. The street signs and advertising is carried out in that style. We found that many of the shops were quite complete, both in variety and quantity. The garages were marked livery stables and were built somewhat in the style of an old time livery stable. One of the stores featured baskets; they claimed to be the largest basket store in the states. I could not dispute that for they surely had many times more baskets than I had ever seen before. Another very interesting place was the Arabian Bazaar. Here they had hundreds of items from foreign countries but especially wonderful were the pieces from Arabia and India. I have never seen anything like it outside of our great cities like New York and one might do a lot of hunting to find these items there.

It was hard to pull away from the interesting shopping places but if we were to see the gun show we had to get going. The Arizona Gun Collectors Association were holding the exhibit at the Salt River Project Recreational Area just south and west of Scottsdale. We found the place with little trouble and spent about two hours looking over a large collection of old and unusual guns. Some were for sale and some for show only. There were several exhibitors from out of state. There was to be an auction later in the day but we could not stay for it.

The wife wanted to further shop for some special dress goods so we went into Phoenix and as the stores were to be open late, we got a bite to eat and then went to shop. We did not find what she wanted and about nine we called it quits and looked for a motel.

Sunday morning we got out about seven and after hunting up some breakfast we proceeded to the range. The range where the shoot was to be held is called the South Mountain Range and it lies some ten miles south of the city. It is under the supervision of the Phoenix police. The greater part of the facilities were given over to position shooting for both small bore and big bore but at one side and a little above the main range was a nice set-up for bench shooting. We arrived at the range at about eight o'clock but found not a soul there. It was too cold to sit or stand around and wait, so we went back and drove around the city for an hour. The day was bright and clear but the temperature was not much above freezing; really cold for Phoenix.

Back at the range we found that most of the clan were assembled. We introduced ourselves and were warmed by the seemingly friendly and interesting people. There was a fine assortment of unlimited and varmint rifles, mechanical rests and equipment. The day promised to be interesting. There were seven good benches under cover. The cover was wide and prevented the sun from striking the benches to any extent; a good thing most of the time I would think but this day we needed that warmth very much. One was not long comfortable sitting.

A capable lady, Mrs. Ruth McMillan, was taking fees and holding bench numbers for drawing. I paid my fee and drew bench No. 1. After looking over the collection of fine bench rifles I was more than a little hesitant about bringing out my pieces. I am not as artistic as I should be and I have guns to shoot and seldom

(Continued on Page Sixteen)

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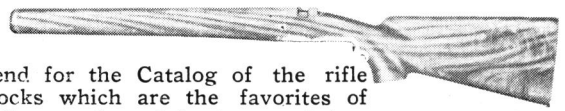

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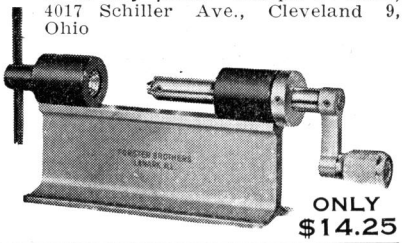

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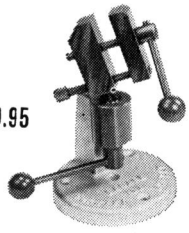

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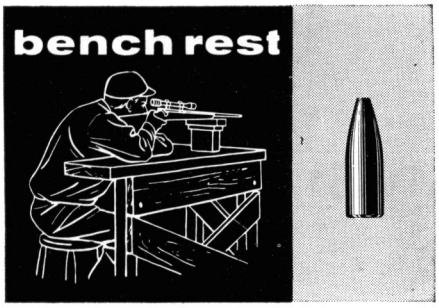

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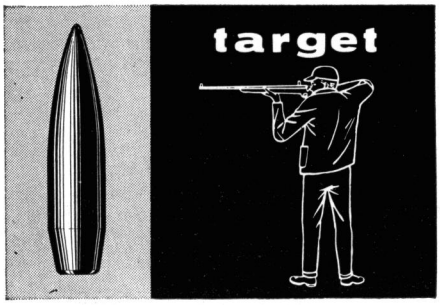

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Letters

(Continued from Page Fifteen)

care enough about how they look. I never thought that I could afford time to dress up my own. The shoemaker and his wife seldom have shoes, you know.

The Arizona Bench Rest Shooters Association program for the day was for 100 yards only. There were to be three ten shot matches with the unlimited rifles, then one trophy match for members only, and a re-entry match of five shots, best target out of three. Next was to be four five-shot matches with the thirteen pound rifles and a trophy match for members only. Then there were three five-shot matches for the ten pounders, of "gravel pit rifles" as they called them, followed by a five-shot trophy match for members only. I thought this idea of a trophy match for members only was a good thing as it tends to cause people to join the club. A Mr. J. Peters from Casa Grande and I were the only nonmembers and of course could not shoot for the trophies.

Mr. Frank Minucci, a very fine gentleman from Globe, Arizona, did a splendid job of scoring targets. He had his own Sweany device. He did this work and shot also. Ruth McMillan, the able club secretary, kept the score sheet right up to date and also took her regular turn in shooting. To me it is hard to understand why we don't have a lot more bench shooters take part in matches when they have a chance to work with such a fine group. I really think that it is because they are sort of afraid and then too they don't know how much fun bench shooting can really be.

There were eleven shooters that took some part in the shoot but not all of them took advantage of all the matches. Jim Wilkinson, the owner of the well known jobbing house at Prescott, called the RIFLE RANCH, was present and gave some assistance but took part in only one of the trophy matches. Mr. Hoover shot only the three matches for the ten pound rifles.

The match got "booming" about ten A. M. It is rather hard to get started much earlier at this time of year because they shoot rather towards the East and the sun makes it rather a problem until it gets up in the heaven a ways.

As stated, I had drawn bench No. 1, and on my right was the able contender from Casa Grande and Custer, Jack Williams. On No. 3 was one of the pillars of the game, Frank Minucci of Globe. On No. 4 was a very quiet little gentleman from Scottsdale, L. Brenner. He not only makes his bullets but makes the dies to make the bullets as well. His regular business is groceries. You see you don't have to be a machinist or gunsmith to do these things, as is sometimes claimed. The next contender was the striking gentleman from the lumber business in Phoenix, the "boy friend" of the secretary, Pat McMillan. Pat was by far the heaviest winner for the day and it was no accident. Pat makes up all his rifles for himself and his wife, Ruth. He does a very fine job of stocking and the bullets all seemed to know where to go. The McMillans are a team like the Wilsons in Seattle; very hard to beat. On No. 6 was a very staunch gentleman from Phoenix, Ed Ruch, one of "Uncle's" special workers and a lover of our game. Bench No. 7 was in use by the secretary and the scorer. Mark Hannon, a business man from Phoenix, and Ruth McMillan shot in the second relay.

The scores for the three ten-shot matches with unrestricted rifles (the last column is the aggregate) were:

Frank Minucci	.310	.470	.480	.420
Pat McMillan	.410	.540	.470	.473
R. W. Lathrop	.380	.600	.640	.540
Mark Hannon	.580	.640	.500	.573
Jack Williams	.830	.620	.430	.626
L. Brenner	.670	.640	.600	.636
Ruth McMillan	.470	.650	.820	.646
Ed Ruch	.550	.830	.770	.716

Then in the trophy match Jack Williams got hot and won it with .380, followed by Minucci's .420 and Brenner's .425. This is the second win by Jack for the trophy. The McMillans have won it twice, also. The third time it is won it stays home. Pat turned in a neat .200 to win the re-entry match, followed by Jack with a .230 and Lathrop with .250.

In the four five-shot matches for thirteen pound rifles the groups were not very much different than the ten-shot groups with the unlimited rifles. The rankings were:

Pat McMillan	.470	.500	.320	.410	.425
L. Brenner	.720	.330	.490	.250	.447
Ed Ruch	.650	.680	.470	.500	.575
Jack Williams	.590	.420	.710	.660	.595
J. Peters	.440	.830	.790	.510	.617
R. W. Lathrop	.720	.390	.570	.800	.620
Frank Minucci	.740	.570	.777	.420	.625

I had expected to do my best work in this class but I sure got fouled up with a case problem. Ruth McMillan did not do so well and I find she did not record her scores but she bounced right back and won the trophy match for this class with a .310, followed by Brenner's .400 and Minucci's .500.

Results for the three five-shot matches with the ten pounders were:

Pat McMillan	.440	.540	.380	.453
Ed Ruch	.720	.420	.510	.550
J. Peters	.600	.660	.700	.653
Ruth McMillan	.530	.650	.720	.633
Mark Hannon	.755	.700	.620	.691
Frank Minucci	.720	.770	.720	.736
R. W. Lathrop	.550	.910	.920	.793
Jack Williams	.740	1.03	.800	.856
D. Hoover	1.47	1.43	1.19	1.36

The trophy shoot for these light rifles was next in line and Jack Williams came alive and shot a .280 to win, followed by .440 by Pat and .720 by Hannon, who shot a fine little .17 cal. rifle.

Lathrop and Williams shot .222 Rem. Magnum rifles and I believe that everyone else used the standard .222. All matches moved along smoothly and I was much impressed with the group and the way the shoot was conducted. I do not expect to be here in Arizona for long but I shall join the club and work with them while I am here.

R. W. Lathrop

GRIGG ADDS INFORMATION

Dear Phil:

I very much appreciate Mr. Kirby's comments, and at the same time am glad that his penetrating mind has turned up no serious charge against me. Regarding accuracy, I am aware that all are prone to err, and so in that article (THIS VIBRATION BUSINESS, Oct. 1960) I spared no pains to cross-check by analogy and comparison. With the differential equation, for instance, I derived first for a simple mass being lifted by a coil spring. Later, to be sure of the reasoning, I meticulously wrote up the final development to almost the length of what was written for print. Account of the rifle's irregular contour, I employed the method of swinging it as a pendulum and timing the oscillations in order to calculate the moment of inertia. For the moment of inertia of the barrel itself I used caliper measurements, taking to account both barrel taper and bore volume. Taking all together, I believe that the total result is accurate in an engineering sense.

The barrel sag was calculated with

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equal care, and found to be .0098"; about 1.7 minutes of angle. Regarding it, Mr. Kirby's comment shows his qualitative understanding of basic principles, but in the sense to which he refers, I believe that barrel sag cuts no figure. About 1937 I calculated for .22 rimfire the centrifugal thrust on a curved barrel and obtained a figure so small that, ever since, I have deemed centrifugal thrust as of no consequence in a shoulder arm. My calculation now for a 180 grain bullet moving 3000 f.s. at the muzzle of a 24 inch barrel sagged 2 minutes yields .00006 pounds—in comparison, merely a bubble in the foam of beer.

Mr. Kirby maybe is puzzled, but does not question the figure for vibration frequency of my barrel. The veracity of this figure is essentially established by Mr. Friesecke's table, which shows figures for free-free vibration in the fundamental mode. My figure is for fixed-free vibration, i. e. of the mounted barrel. The coefficient for conversion of one fundamental to the other, a uniform cylindrical rod assumed, is .3968 squared. This multiplied into 245 yields 38.55 cycles, which is about what Mr. Friesecke should find for his tapered barrel mounted in a rigidly fixed receiver. If further we subtract 1.5" for mounting thread from both my 28 and his 24 inch barrel, and then multiply 38.55 by 22.5/26.5, quotient squared, we get 27.79 for approximate frequency of the Mauser barrel if it were 28 inches long. The comparison with my figure is favorable. The coefficient .3968 may either be found in standard texts, or be derived from their subject matter. I have good reasons to believe that this relation was first published by Lord Rayleigh in his theory of sound.

Eq. (1) is correct for rotation about a fixed center O (O having failed to appear in the sketch, but its place being apparent). In actuality, fixity is approximated with sufficient accuracy if the buttplate is firmly against the shoulder, so that the resisting mass equals the sum of the rifle and body mass. To assume the rifle free would require much complication that were both futile and needless; for, if the rifle were free, it would indeed rotate about its center of percussion which lies on a vertical axis that contains the center of gravity. In Fig. 3 the rifle came back 1/64 of an inch while the bullet was in the bore. Nevertheless rotation was about the moving point O, while in the meantime, of course, the acceleration forces balanced the pressure on the bolt face, and the angle of rotation was sensibly the same as if O were fixed. Eq. (1) predicates fixity to avoid complexity.

While I agree for reasons which he states that it would be unpleasant to fire a high power rifle with the shoulder against a brick wall, at the same time I believe that it is usually considered that recoil hurt is less severe when the buttplate is firmly against a shoulder that is free to move. Then the body is a part of the recoiling mass; and in accordance with the principle that in the equal moments the velocity ratio is the inverse of the mass ratio, and recoil energy is proportional inversely to the mass of the recoiling parts. If the body is one of these parts the recoil energy is very much less; and, though the body is moved, perhaps the hurt is less.

(Continued on Page Eighteen)

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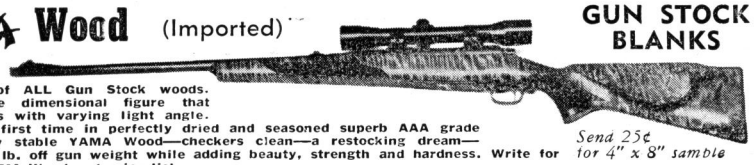

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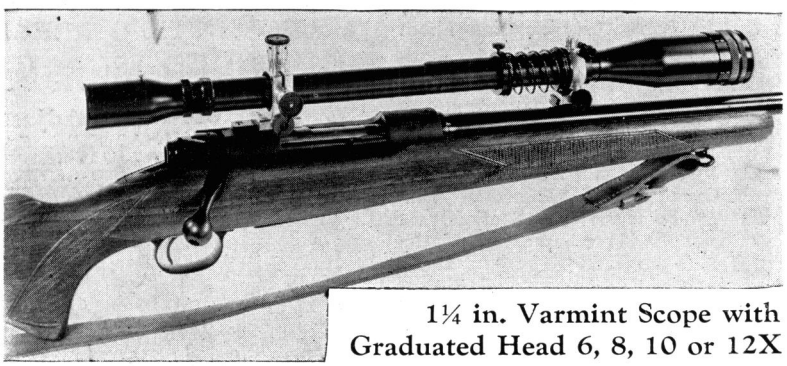

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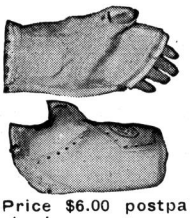

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Letters

(Continued from Page Seventeen)

REJUVINATING A BARREL

Regarding the unevenly obstructed Remington 37 barrel with which I was in trouble at time of my last letter, I since concluded that baked Lesmoke fouling is what the obstruction was. Fact that the barrel was used from '48 to '53 bears out this belief. It is further bourne out by my knowledge of three match barrels which were discarded, perhaps needlessly, in that period, because they shot like smoothbores.

Trying to cut that fouling with emery is like trying to reduce a block of coal tar with a file. The file just pushes the stuff around. But I finally got the barrel clear, after having cast 14 lead laps and devoted more than two days to use of them. The bore finished .2211", which is still .0012" smaller than my 52-C barrel. In that day Remington bored them smaller than did Winchester, and possibly does it yet.

Since the lapping I have concluded my third successful barrel fitting job by replacing with this 37 the 21 inch barrel that was in my "B" action with Thomas trigger. In all three jobs I used a chamber reamer made by my own slow hand methods. I'm so proud of the "B" rifle now that I can hardly keep my hands off it.

I enjoyed Chris Westergaard's article very much. At Camp Perry in 1959 Chris fired all the smallbore prone and the position matches too. Near the end, August told me that his dad was just about played out.

Jesse M. Grigg

FROM "MR. SCHUETZEN"

Dear Teachout:

I noticed the reprint of the Schuetzen Article I wrote way back in 1928.

The old Schuetzen game is **not** like it used to be, but still a little activity out here in the wild west. We had a tournament here in Whiting (Iowa) last Sunday (December 4th) and herewith are the scores.

I am still active in the shooting game. Next week I and my wife leave for Florida for the winter. We have been down there the last three winters and every year I shoot in all the mid-winter matches down there; Miami, St. Pete and Winter Haven. If you wish to write, address; Tropic Garden Motel, 6925 S. W. 8th Street, Miami, Florida.

Best wishes,
Chris Westergaard

At the Schuetzen tournament Chris mentioned the program included a 100 shot match on the NRA 50 feet target, plus one, two, three, four and five shot matches on the 25 count ring target, all offhand. Fifteen shooters competed.

August Westergaard, Chris' son, won the 100 shot match with a 952 score. The next five ranking scores were 938, 927, 920, 913 and 900.

Chris Westergaard won the five-shot match on ring target with the only 125 possible score for that match. Two or more possible scores were posted in all the other matches on the ring target. August Westergaard won the two-shot match on the ring target. Dennis Dingman, Sioux Falls, S. D., third in the 100 shot match, won the three-shot and four-shot matches. Tom Berry, Nebraska University, runner-up in the 100 shot match, was also runner-up in the one-shot and two-shot matches.

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BEGINNERS CORNER

By Robert F. Stinehour

Much has been written and discussed on mirage and the "doping" of it, but still some pretty experienced shooters will get caught at times with a bad shot through carelessness.

There are a few things that we can say for sure about mirage, wind, and their effect on our bullets. First of all we know for sure that mirage will definitely carry our bullets in the direction of its flow, like a cork floating down stream. I have fired near shooters who could not tell which way the mirage was flowing, when it flowed enough from 9 to 3 o'clock to carry a bullet .30" to the right. If a shooter can not discern this he is lost in anything but perfect conditions and will never be a good shooter. Knowing the bullet drifts in the direction of the mirage, and varies its degree of drift with the intensity of the mirage, and wind drift or lack of wind drift, it is just a matter of practice to learn how much to hold for a given condition. When one is not sure they are interpreting the conditions reasonably well, they should go back to the sighter and check.

Secondly, we know that unless it is a real strong wind, mirage will carry our bullets farther than the wind drift will. This is proven quite often when a shooter will have a fair group going in a medium but uniform mirage, say from 9 to 3 o'clock, and the breeze intensifies from the same direction enough to blow most of the mirage off and clear the target. The inexperienced shooter will hold more into the wind than he held into the mirage, and "Oops," the shot went right where he held it and out of the group. I don't think there are any of us who have shot much who have not done this to some degree, sometime.

The mirage versus breeze was proven to me, much to my chagrin, at a match that the Plainfield, N. H. Club held this year. As most know, I seldom watch any flags, but in the 200 yard matches a flag was perched on the target frame and visible in my scope, when on target. As I remember it, the mirage was pretty consistent from 3 to 9 and to keep my shots in the ten-ring it required holding .200" to .800" at 3 o'clock. On the eighth shot, after having seven in the ten-ring measuring not more than .800", the flag in my scope view turned for the first time and stood out pretty well from 9 to 3, the mirage being in closer was still the same 3 to 9. Instead of holding .300" at 3 o'clock, I held .500" at 9 o'clock, and before I checked the shot I knew I had one of Gene Beecher's "key shots." There it set, .600" or .700" out of the group at 9 o'clock. I say "down with all wind flags"; but seriously, that is why I think watching a flag at the targets is more harm than good.

Better to watch the clouds as Bob Hart does. I don't know what he sees up there, but he shoots pretty darned good. For the benefit of those who have never seen him shoot, he sometimes looks like a man in a duck blind watching for a flock to come in, but he gets results.

Varying light will raise or lower shots. For the most part, a darkening condition, such as the sun going behind a cloud, will lower a shot, and raise one when it comes out again. This is not necessarily so though, and for this reason it is well to again check on the sighter in any great change of light.

It has been my experience that my first impression of a condition is the best. Many, many times when I get a bad shot it is because I changed my mind. It's strange that we know these things and continue to make mistakes.

To my way of thinking, it is **very** important to get the sight picture and interpret the conditions as quickly as possible. It is **impossible** to match one's scope to one's eye perfectly. Therefore the eye must adjust to the scope, and looking through the scope for long periods puts much more strain on the eye than many realize. It's not my recommendation that everyone load and shoot as fast as I do. Take your time loading and anything else, but don't keep that eye to the scope for long periods. The first sight picture is the most accurate. Being a bag squeezer, my rifle is completely off target while loading. After loading, the rifle is slid forward and the bag squeezed up to nearly align the rifle on the target; then and not until then does the eye go to the scope. If the rifle is aligned enough to get the shot off quickly with that first sight picture, it goes. If not, it is held firmly, close to the aiming point, and the eye comes away from the scope for a few seconds, for a rest. Then the eye goes back to the scope, gets that first sight picture, and gets the shot off quickly.

One can further rest the eye by not checking the fired shot until after reloading and while sighting for the next shot. This works very well for me.

At the loading benches, the wailing wall and other places, inexperienced shooters ask questions about most everything except shooting technique. Many seem embarrassed to ask questions in this direction and this should not be so, for they could have the best rifle and components on the line, and get nowhere unless it is aimed properly.

It's partially by asking that we learn. I'm still asking and by golly maybe if I never stop, someday I may know something!

(Editor's comment: Bob Stinehour is quite well aware that mirage does not drift bullets, but only makes the aiming point look where it ain't. However, mirage conditions do require aiming compensations similar to those for wind, so we are letting his comments go "as is." Bob comments that when a major optical company advertises that their scopes "eliminate mirage," that he shouldn't be censored too much if he strays a bit from strict facts.)

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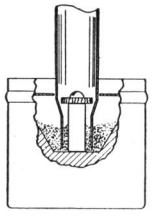

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How To Run A Pistol Tournament

(Continued from Page Two)

were 299's and 298's. Three 300 possible scores were made in the .22 cal. individual match, two of them by police officers and one by a civilian.)

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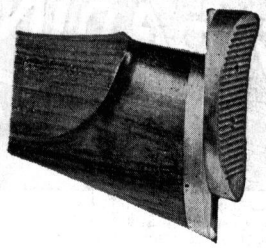

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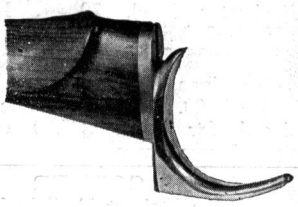

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